



BMP Pilot Studies

Quarterly Status Report No. 4

BMP Pilot Projects in Los Angeles and San Diego Counties.

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INTRODUCTION

Background and Purpose

Periodic status reports and meetings are specified in the District 7 and District 11 Scoping Study as a vehicle to update NRDC, EPA, and other Plaintiffs on the progress of the BMP Retrofit Pilot Program and receive input as to appropriate changes or modifications to the program. The status meetings have been scheduled on a regular basis to coincide with general project milestones and periods of significant activity. Approximate scheduled dates for the periodic status meetings are given in the Scoping Study. This report provides background documentation for the fourth status meeting to be held on March 11, 1999.

The scope of the status reports includes a general program-level overview of the activities that precede the status meetings. Status reports include information regarding the Pilot Program 1) construction, 2) operation and maintenance program, 3) program costs, 4) sites under design, and 5) vector and environmental issues. Each of these topics will be addressed as the information becomes available over the scheduled course of the BMP Retrofit Pilot Program. The program Master Schedule is contained in the Scoping Study for each District.

The preceding Status Meeting (No. 3) was held on December 7, 1998. The meeting minutes are provided in Appendix A. The main issues discussed at Status Meeting No. 3 included the following:

- Construction status for each District
- Status of the OMM plans
- Status of Vector Control Agreements
- Status of Design Packages for District 11
- Issues agreed upon include:
 - It was agreed that Caltrans could bring each site 'on-line' and begin monitoring as construction was finished without further review of the site by the Plaintiffs.
 - It was agreed that the OMM plan was acceptable for use by the field crews as the pilot projects were brought on line for monitoring, however the

manuals should be further refined per comments received from the Plaintiffs and the field crews.

A field trip to the sites in District 11 followed the meeting (December 8). A field trip continued to the District 7 sites the following day (December 9).

CONSTRUCTION ACTIVITIES

District 7 BMP Pilot Projects

Construction Activities, Schedule, Issues / Solutions, Financial Review

(For Estimated Dates on Instrumentation/Monitoring refer to table on page 32)

PS&E Pilot Projects

Location 1 (MW) I-605/SR-91 Contract No. 07-191204 Infiltration Basin

Construction Activities

Completion of grading, regrading per revised plan, drainage structures, pavement, drain pipes, fine grading, and hydro-seed. Contractor is in the process of completing the punch list.

Schedule

First working day per contract was November 6, 1998. Construction is 98 percent complete. Anticipated completion date is March 19. The anticipated completion date has been adjusted due to the completion and resolution of the punch list items and issues.

Issues / Solutions

- The existing cloverleaf outlet pipe appears to be clogged, and therefore the improvements are not operating as designed (runoff is backing up along the earth swale and concrete swale). The proposed fix involves a new concrete headwall and a pipe extension. A change order is being prepared for this additional work. Drawings have been prepared and being reviewed by the Contractor. Costs to be determined.

- The following punch list items are currently under review for resolution by the BMP Team: basin floor elevation, overflow swales and weirs.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
1 I-605/SR-91	11-6-98	1-13-99	3-19-99	\$255,646	\$2,000 Traffic Control \$1,000 Lead Sampling \$2,000 Maintain Elec. Sys \$1,000 Rem. Buried Objects \$2,900 Grading Revision (\$25,200) Grading Revision \$17,000 Asphalt Concrete Total \$700	\$256,346



Location 1 (BC) I-5/I-605 Contract No. 07-191104 Extended Detention Basin

Construction Activities

Completion of grading, concrete for basin, pavement. Contractor is working on the punch list. Site is operational.

Schedule

First working day per contract was November 4, 1998. Construction is 99 percent complete. Adjusted completion date is March 12.

Issues / Solutions

The BMP Team is currently reviewing the replacement of the temporary rail with metal beam guard rail.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Final Cost Including CCO and State Furnished Materials
I I-5/I-605	11-4-98	1-6-99	3-12-99	\$119,511	\$1,500 Traffic Control \$1,000 Lead Sampling \$155 Inlet Drain Holes Total \$2,655	\$122,166



Location 2 (BC) I-605/SR-91 Contract No. 07-191104 Extended Detention Basin

Construction Activities

Completion of grading, concrete for basin, and pavement. Contractor is working on the punch list. Site is operational.

Schedule

First working day per contract was November 4, 1998. Construction is 99 percent complete. Adjusted completion date is March 12.

Issues / Solutions

The BMP Team is currently reviewing the replacement of the temporary rail with metal beam guard rail.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Final Cost Including CCO and State Furnished Materials
2 I-605/SR-91	11-4-98	1-6-99	3-12-99	\$ 119,511	\$1,500 Traffic Control \$1,000 Lead Sampling \$155 Inlet Drain Holes Total \$2,655	\$122,166



Procurement Pilot Projects

Brown and Caldwell Sites

Location 1 Alameda Maintenance Station Oil/Water Separator

Construction Activities

A job walk was conducted on February 4. Bob Wu, Tyrone Taylor and Kuen Tsay (Caltrans), Rex Rasmussen (RBF), Marc Damikolas (Brown & Caldwell) and subcontractors were in attendance. The site was surveyed and staked on February 11. Contractor has received the oil/water separator on February 19. The site utility survey has been completed and pot-holes dug to confirm location of utilities.

Schedule

It is anticipated that work will begin on March 1. The estimated completion was adjusted to April 2.

Issues / Solutions

- The design location of the pre-fabricated tank for the oil-water separator was rotated 90 degrees to avoid a bridge footing.
- The elevation of some utilities may conflict with the trench drain elevation. Minor utility relocation may be required.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
1 Alameda MS	12-18-98	1-27-99	4-2-99	\$172,049	N/A	\$172,049



Location 2 Eastern Maintenance Station Media Filter

Construction Activities

Completion of shoring, backfill, installation of catch basin and electrical conduit, fine grading, pavement, platforms, fence and equipment. Site is operational. A punch list job walk is scheduled for the week of March 8.

Schedule

First working day September 25, 1998. Construction is 99 percent complete. The estimated completion date is March 12, 1999.

Issues / Solutions

Utility (sewer, gas, electric) conflicts along with rain delays have contributed to the delay in project completion.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost (under negotiation)	Estimated Final Cost Including CCO and State Furnished Materials
2 Eastern MS	9-25-98	12-8-98	3-12-99	\$267,570	\$16,000 Utilities	\$47,670	\$331,240



Location 3 Foothill Maintenance Station Media Filter

Construction Activities

Completion of vault, removal of shoring, backfill, installation of electrical conduit and catch basin. Installation of fence is in progress. Site is operational.

Schedule

First working day October 1, 1998. Construction is 97 percent complete. The estimated completion date is March 12, 1999.

Issues / Solutions

Delays at other BMP sites affected the schedule for this site along with recent rain delays.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost (under negotiation)	Estimated Final Cost Including CCO and State Furnished Materials
3 Foothill MS	10-1-98	1-4-99	3-12-99	\$400,647	N/A	\$68,955	\$469,602



Location 4 Termination Park and Ride Media Filter

Construction Activities

Completion of vault, removal of shoring, backfill, repair of electrical and irrigation systems, fine grading, and equipment pads. Contractor is in the process of installing pre-cast sampling and interceptor boxes. It is anticipated that the site will be operational by March 4.

Schedule

First working day October 1, 1998. Construction is 95 percent complete. The estimated completion date is March 18, 1999.

Issues / Solutions

- Caltrans is working on a solution to accommodate Brown & Caldwell's request to connect BMP electrical service to existing Caltrans conductors.
- Utility (electric, irrigation) conflicts combined with rain delays have contributed to the delay in completion.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost (under negotiation)	Estimated Final Cost Including CCO and State Furnished Materials
4 Termination Park & Ride	10-1-98	12-21-98	3-18-99	\$372,982	\$4,500 Utilities	\$66,132	\$443,614



Location 6 Via Verde Park and Ride Multi Chamber Treatment Train

Construction Activities

Completion of construction of first chamber, removal of shoring, backfill, and construction of filter basin.

Schedule

First working day October 8, 1998. Construction is 85 percent complete. The estimated completion date is April 2.

Issues / Solutions

Delays at other BMP sites combined with removal of subsurface rock, additional shoring time and rain delays have contributed to the delay in completion.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost (under neg.)	Estimated Final Cost Including CCO and State Furnished Materials
6 Via Verde Park & Ride	10-8-98	1-15-99	4-2-99	\$309,633	\$17,400 core boulders \$400 Utilities Total \$17,800	\$39,663	\$367,096



Location 8 Lakewood Park and Ride Multi Chamber Treatment Train

Construction Activities

Completion of excavation, shoring, and first chamber. Excavation for the filter basin has started.

Schedule

Construction is 75 percent complete. The estimated completion date is March 29.

Issues / Solutions

- Caltrans is working on a solution to accommodate Brown & Caldwell's request to connect BMP electrical service to existing Caltrans conductors.
- Delays at other BMP sites affected the schedule for this site along with a total of 5 days lost due to rain.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost	Estimated Final Cost Including CCO and State Furnished Materials
8 Lakewood Park & Ride	12-4-98	2-4-99	3-29-99	\$388,037	N/A	\$57,150	\$445,187



Montgomery Watson Sites

Location 1 Package 1 Altadena Maintenance Station Bio-Strip and Infiltration Trench

Construction Activities

Completion of drainage structures, rock in infiltration trench, lysimeter and monitoring well installation, bio-strip, electrical power, fine grading, sod installation, fencing, and spreader ditch. Site is operational. Punch list job walk is scheduled for March 8.

Schedule

First working day October 5, 1998. Construction is 99 percent complete. Adjusted completion is March 12.

Issues / Solutions

- Site construction is behind schedule due to relocation of infiltration trench to avoid existing utilities and the Contractor scheduling crews and equipment for other BMP sites.

- Existing underground electrical was damaged during excavation. The conduit is being rerouted.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Material (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
1 Package 1 Altadena	10-5-98	12-18-99	3-12-99	\$197,574	N/A	\$3,673	\$201,247



Location 6 Package 1 Foothill Maintenance Station Catch Basin Insert

Construction Activities

Completion of catch basin, flume, pavement, filters, equipment pads, equipment and punch list. As-built drawings to be provided. Site is operational.

Schedule

First working day October 5, 1998. Construction was 100 percent complete on January 8, 1999.

Issues / Solutions

- Rain gauges were relocated to the top of the equipment enclosure due to post instability.
- Equipment pads were extended to accommodate the enclosure.
- See memorandum enclosed in Appendix B on poor performance of the CBI.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
6 Package 1 Foothill	10-5-98	12-18-98	1-8-99	\$67,730	N/A	\$67,730



Location 7 Package 1 Las Flores Maintenance Station Catch Basin Insert

Construction Activities

Completion of punch list items, filter installation, equipment pads and equipment. As-built drawings to be provided. Site is operational.

Schedule

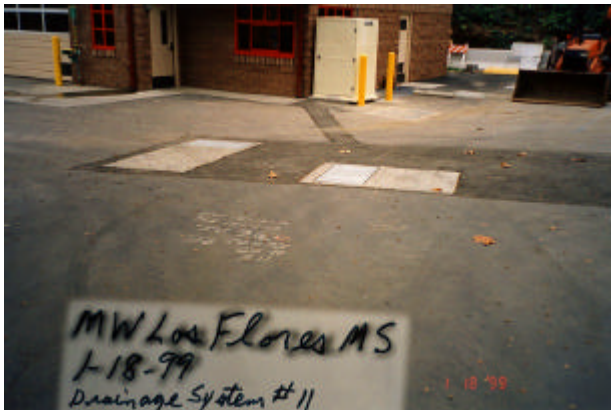
First working day October 5, 1998. Construction was 100 percent complete on January 8, 1999.

Issues / Solutions

- A meeting was held on February 9 with the Maintenance Station Superintendent to review the construction. The Superintendent requested that the equipment pad be relocated away from the window. The request is under review by MW and Caltrans.
- Rain gauges were relocated to the top of the equipment enclosure due to post instability.
- Equipment pads were extended to accommodate the enclosure.
- See memorandum enclosed in Appendix B on poor performance of the CBI.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
7 Package 1 Las Flores	10-5-98	12-18-98	1-8-99	\$81,431	N/A	\$81,431



Location 8 Package 1 Rosemead Maintenance Station Catch Basin Insert

Construction Activities

Completion of equipment pads and equipment, flumes, and installation of filters. Construction complete except for new G2M Inlet cover on final punch list. As-built drawings to be provided. A meeting was held with the Maintenance Station Superintendent to review the construction. The Superintendent has no outstanding issues other than the G2M inlet cover. Site is operational.

Schedule

First working day October 5, 1998. Construction is 99 percent complete.

Issues / Solutions

- Final completion will be delayed due to fix of G2M Inlet cover. However, this does not affect site operations and monitoring.
- Rain gauges were relocated to the top of the equipment enclosure due to post instability.
- Equipment pads were extended to accommodate the enclosure.
- See memorandum enclosed in Appendix B on poor performance of the CBI.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
8 Package 1 Rosemead	10-5-98	12-18-98	1-8-99	\$59,390	N/A	\$59,390



Location 2 Package 2 I-605/SR-91 Interchange Bio Strip & Swale

Construction Activities

Completion of clearing/grubbing, juncture structure, flumes, fine grading and sod installation. Both BMP sites are operational; however, they are not ready for monitoring. Punch list job walk is scheduled for March 8.

Schedule

First working day November 30, 1998. Construction is 99% complete. Adjusted completion date is March 12.

Issues / Solutions

The salt grass coverage appears to be less than optimal. This is currently being researched and reviewed by the BMP Team.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Material (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
2 Package 2 I-605/SR-91	11-30-98	1-29-99	3-12-99	\$166,715	(\$8,000) reduction in top soil. (\$1,500) Deletion of light pole relocation Total (\$9,500)	\$20,812	\$178,027



Location 3 Package 2 Cerritos Maintenance Station Bio Swale

Construction Activities

Completion of clearing/grubbing, juncture structure, flumes, fine grading, sod installation, and equipment pads. Site is operational. Punch list job walk is scheduled for March 8.

Schedule

First working day November 30, 1998. Construction is 99 percent complete. Adjusted completion date is March 12.

Issues / Solutions

The salt grass coverage appears to be less than optimal. This is currently being researched and reviewed by the BMP Team.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Materials (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
3 Package 2 Cerritos MS	11-30-98	1-29-99	3-12-99	\$57,727	N/A	\$1,225	\$58,952



Location 4 Package 2 I-5/I-605 Bio Swale

Construction Activities

Completion of clearing/grubbing, grading, catch basin, flumes, fine grading and sod installation. Site is operational. Punch list job walk is scheduled for March 8.

Schedule

First working day November 30,1998. Construction is 99% complete. Adjusted completion date is March 12.

Issues / Solutions

The salt grass coverage appears to be less than optimal. This is currently being researched and reviewed by the BMP Team.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Material (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
4 Package 2 I-5/I-605	11-30-98	1-29-99	3-12-99	\$124,575	(\$35,000) Delete Maint. Pullout	\$7,344	\$96,919



Location 5 Package 2 I-605/Del Amo Bio Swale

Construction Activities

Completion of clearing/grubbing, grading, drainage system, fine grading, metal beam guard rail, sod installation and vehicle turnout. Site is operational. Punch list job walk is scheduled for March 8.

Schedule

First working day November 30,1998. Construction is 99 percent complete. Adjusted completion date is March 12.

Issues / Solutions

The salt grass coverage appears to be less than optimal. This is currently being researched and reviewed by the BMP Team.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Materials (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
5 Package 2 I-605/Del Amo	11-30-98	1-29-99	3-12-99	\$119,895	N/A	\$4,285	\$124,180



Package 3 Sites:

Per the tentative agreement with the plaintiffs, the District has resumed the design for Continuous Deflection Separation Units (CDSs) at Site 1, located at I-210 East of Orcas Avenue and Site 2, located at I-210 East of Filmore Street. The system is anticipated to be in construction 8/15/99 and ready for operation before 10/15/99.

San Diego County BMP Pilot Projects

Construction Activities, Schedule, Issues / Solutions, Financial Review

(For Estimated Dates on Instrumentation/Monitoring refer to table on page 32)

PS&E Pilot Projects

Location 1 I-5/SR-56 Extended Detention Basin

Construction Activities

Contractor has been given relief of maintenance.

Schedule

First working day per contract was September 14, 1998. Construction is 100 percent complete. Site is operational.

Issues / Solutions

A remaining maintenance issue, which does not affect the site operations, is the installation of the canal gate. RBF has received the canal gate shop drawings from the fabricator. The drawings were reviewed and comments were provided to the Caltrans RE on Feb 2. The fabricator received approved drawings on February 25. The quoted delivery for the gates is between April 12 and April 27.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
1 I-5/SR-56	9-14-98	11-18-98	12-31-98	\$130,739	\$10,000 Spillway excavation \$7,100 Import borrow \$1,300 access road \$1,500 Flume Total \$19,900	\$150,639



Location 2 SR-78/I-15 Extended Detention Basin

Construction Activities

Construction and punch list items complete except for the canal gates. Contractor has been given relief of maintenance. Site is operational.

Schedule

First working day per contract was September 14, 1998. Construction is 100 percent complete.

Issues / Solutions

A remaining maintenance issue, which does not affect the site operations, is the installation of the canal gate. RBF has received the canal gate shop drawings from the fabricator. The drawings were reviewed and comments provided to the Caltrans RE on Feb 2. The fabricator received approved drawings on February 25. The quoted delivery for the gates is between April 12 and April 27. This does not affect site operations.

Financial Review

Due to the extent of the man made buried objects at this location, many items of work were revised. To reduce costs, the bid amount was reduced to five items of work (i.e.: Water Pollution Control, Erosion Control, Class 2 Aggregate Base, Asphalt Concrete, and Miscellaneous Iron & Steel), and the remaining work was done by contract change order.

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
2 I-15/SR-78	9-14-98	11-18-98	12-31-98	\$80,000	(\$240,500) Concrete lining deletion \$1,014,000 Removal man made buried objects & construction of BMP at forced account \$1,500 Flume Total \$775,000	\$855,000



Location 3 I-5/La Costa Infiltration Basin

Construction Activities

Construction is complete. Contractor's obligations have been met.

Schedule

First working day per contract was September 14, 1998. Construction is 100 percent complete.

Issues / Solutions

- Standing Water.
- Caltrans met with San Diego County Vector Control District personnel on February 11. The Vector Control District plans to issue a letter stating their concerns of standing water and presence of vectors.
- Caltrans intends to have an independent geotechnical engineer review the siting and design documentation for the site. RBF is assembling the project

documentation scheduled for completion mid March. Woodward Clyde will perform a review of this information, perform a geotechnical assessment, scheduled for completion in May. Upon completion, a discussion on decommissioning will be initiated.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
3 I-5/La Costa	9-14-98	11-18-98	N/A	\$ 208,221	\$29,400 Removal of unsuitable material \$2,000 Removal of unsuitable material \$400 Flagging Total \$31,800	\$240,021



Procurement Pilot Projects

Location 1 Kearny Mesa Maintenance Station Media Filter (Compost)

Construction Activities

Construction was completed February 26. Completion of vault and drainage system construction, cartridge and flume installation, connection to existing storm drain, and paving. Walk-through inspection was conducted. Punch list in process of being completed. Site is operational.

Schedule

First working day per contract was November 10,1998. Construction is 100 percent complete. Construction was completed February 26, 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to February 26.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
1 Kearney Mesa MS	11-10-98	12-17-98	2-26-99	\$298,797	\$15,000 Bedrock/Site Revision \$6,300 Additional canisters Total \$21,300	\$320,097



Location 2 Escondido Maintenance Station Media Filter (Sand)

Construction Activities

Construction has been completed. Completion of vault, pipeline, vault frame, flume installation, electrical conduit, paving, guard posts. Walk-through inspection was conducted February 22. Punch list is in the process of being completed. Site is operational.

Schedule

First working day per contract was November 2,1998. Construction is 100 percent complete. Construction was completed February 26, 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to February 26.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
2 Escondido MS	11-2-98	12-23-98	2-26-99	\$490,405	(\$46,000) Substitution with epoxy coated \$5,000 add guard posts \$2,000 Elect Conduit Total (\$39,000)	\$451,405



Location 3 La Costa Park and Ride Media Filter (Sand)

Construction Activities

Completion of vault, manholes, concrete ditches, grading, fence, cable railing and pavement. Walk-through inspection was conducted. Punch list is in the process of being completed. Site is operational.

Schedule

First working day per contract was September 16, 1998. Construction is 100 percent complete. Construction was completed March 1, 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to March 1.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
3 La Costa Park & Ride	9-16-98	11-2-98	3-1-99	\$ 208,955	\$20,000 Unsuitable materials excavation 8,000 Storm drain extension (\$15,000) Delete electrical conduit \$5,500 Safety Railing/Steps Total \$18,500	\$227,455



Location 4 SR-78/I-5 Park and Ride Media Filter (Sand)

Construction Activities

Completion of vault, backfill around vault, grading, drainage structures, flume installation, manhole risers, storm drain connection, fence installation, landscaping and pavement. Walk-through inspection was conducted. Punch list is in the process of being completed. Site is operational.

Schedule

First working day was October 26, 1998. Construction is 99 percent complete. Adjusted completion date is March 3 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to March 3.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Estimated Final Cost Including CCO and State Furnished Materials
4 SR-78/I-5 Park & Ride	9-23-98	11-16-98	3-3-99	\$ 224,502	(\$14,000) Revised vault location \$5,000 plant establishment \$4,500 Safety railing \$2,000 Manhole \$1,000 Fence \$8,200 Landscaping & Irrig. Sys. Total \$6,700	\$231,202



Location 5 Melrose Ave/SR-78 Bio Swale

Construction Activities

Completion of grading, overside drains, flume installation, drainage system, and sod installation. Walk-through inspection was conducted. Punch list is in the process of being completed. Site is operational.

Schedule

First working day per contract was October 21, 1998. Construction is 100 percent complete. Construction was completed on February 26, 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to February 26.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Materials (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
5 Melrose Ave/SR-78	10-7-98	11-19-98	2-26-99	87,038	\$5,000 Unsuitable material \$19,000 Salt grass installation \$11,000 Plant establishment \$4,500 Storm Drain Sediment (\$2,500) Delete Seed \$1,500 Flume Modifications Total \$38,5000	\$30,889	\$156,427



Location 6 I-5 Palomar Airport Road Bio Strip

Construction Activities

Obtained concurrence from the Coastal Commission. Completion of final plans and estimate, and maintenance turnout. Site was surveyed and staked.

Schedule

The construction of the maintenance pullout began on January 18. Construction of the BMP is scheduled to begin week of March 1. Estimated completion date is April 1.

Issues / Solutions

Salt grass flats are planned to be installed. The Engineer's Estimate includes the costs for salt grass installation. A gate will be installed along the frontage road for safer access to the site. Salt grass delivery will lag completion of grading of site by about 1 – 2 months, depending on weather which influences salt grass germination. Nursery reports salt grass will be planted week of March 1 due to relatively warm weather.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Engineer' s Estimate	Estimated Contract Change Orders	State Furnished Material (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
6 I-5 Palomar Airport Road	1-18-99	4-1-99	N/A	\$114,200	\$10,000 Plant Estab. & Temp. Irrigation	\$17,951	\$142,151

Location 7 Carlsbad Maintenance Station Bio Strip Infiltration Trench

Construction Activities

Completion of rock slope over infiltration trench, installation of lysimeter, flume installation, sod installation and pavement. Walk-through inspection was conducted. Punch list is in the process of being completed. Site is operational.

Schedule

First working day per contract was October 12,1998. Project began September 30,1998. Construction was completed on February 26, 1999.

Issues / Solutions

Rain has affected construction activities more than was originally anticipated, and completion of punch list pushed the completion date to February 26.

Financial Review

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Materials (Salt Grass)	Estimated Final Cost Including CCO and State Furnished Materials
7 Carlsbad MS	10-12-98	11-19-98	2-26-99	\$157,800	\$20,000 Unsuitable subgrade \$8,000 Install salt grass \$5,000 Additional paving \$2,000 Elect. Conduit \$5,000 Infiltration Trench (\$18,400) Delete Bioswale bid item \$5,500 Plant Establishment \$1,500 Flume Modifications Total \$28,600	\$9,792	\$196,192



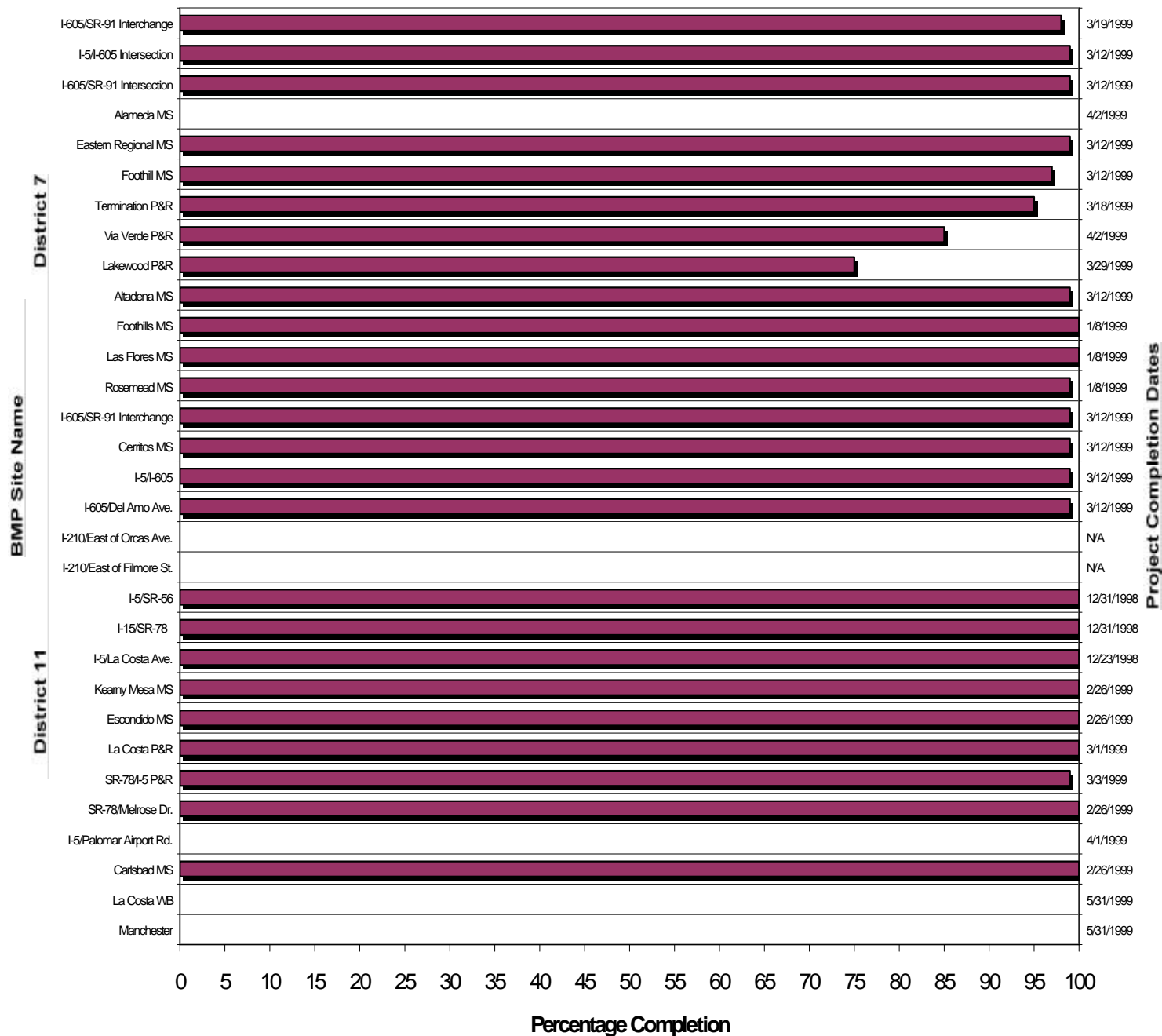
ESTIMATED DATES ON INSTRUMENTATION/MONITORING

Location	Project Type	BMP Type	Monitor Consultant	Site Operational	Begin Instrument Install	Complete Instrument Install	Begin Monitoring/Maintenance
DISTRICT 7							
1 I-605/SR-91	PSE	IB	MW/Law	3/5/99	2/15/99	2/26/99	3/5/99
1 I-5/I-605	PSE	EDB	BC	2/8/99	2/15/99	2/26/99	2/26/99
2 I-605/SR-91	PSE	EDB	BC	2/8/99	2/8/99	2/19/99	2/22/99
1 Alameda MS	Procurement	OWS	BC	2/27/99	3/1/99	3/12/99	3/15/99
2 Eastern MS	Procurement	MF	BC	2/1/99	2/1/99	2/12/99	2/15/99
3 Foothill MS	Procurement	MF	BC	2/22/99	2/22/99	3/5/99	3/5/99
4 Termination Park & Ride	Procurement	MF	BC	3/1/99	3/1/99	3/12/99	3/12/99
6 Via Verde Park & Ride	Procurement	MCTT	BC	4/2/99	4/2/99	4/15/99	4/15/99
8 Lakewood Park & Ride	Procurement	MCTT	BC	3/29/99	3/31/99	4/14/99	4/15/99
1 Package 1 Altadena	Procurement	Bio Strip/IT	MW/Law	2/26/99	2/18/99	2/19/99	2/26/99
6 Package 1 Foothill	Procurement	CBI	MW/Law	1/15/99	1/18/99	1/21/99	1/22/99
7 Package 1 LasFlores	Procurement	CBI	MW/Law	1/15/99	1/18/99	1/21/99	1/22/99
8 Package 1 Rosemead	Procurement	CBI	MW/Law	1/15/99	1/18/99	1/21/99	1/22/99
2 Package 2 I-605/SR-91	Procurement	Bio Strip/Swale	MW/Law	2/25/99	2/25/99	2/26/99	suspended
3 Package 2 Cerritos MS	Procurement	BioSwale	MW/Law	2/17/99	2/17/99	2/17/99	suspended
4 Package 2 I-5/I-605	Procurement	BioSwale	MW/Law	2/17/99	2/17/99	2/18/99	suspended
5 Package 2 I-605/ Del Amo	Procurement	BioSwale	MW/Law	2/23/99	2/22/99	2/23/99	suspended
DISTRICT 11							
1 I-5/SR-56	PSE	EDB	KLI	1/8/99	1/11/99	1/24/99	1/24/99
2 I-15/SR-78	PSE	EDB	KLI	1/8/99	1/11/99	1/24/99	1/24/99
3 I-5/La Costa	PSE	IB	KLI	1/8/99 ¹	1/11/99 ¹	1/28/1999 ¹	1/24/99 ¹
1 Kearney Mesa MS	Procurement	MF (Comp)	KLI	2/12/99	2/12/99	2/12/99	2/16/99
2 Escondido MS	Procurement	MF	KLI	2/12/99	2/12/99	2/12/99	2/16/99
3 La Costa Park & Ride	Procurement	MF	KLI	2/19/99	2/19/99	2/26/99	2/26/99
4 SR-78/I-5 Park & Ride	Procurement	MF	KLI	2/19/99	2/19/99	3/1/99	3/1/99
5 Melrose Ave/SR-78	Procurement	Bio Swale	KLI	2/19/99	2/19/99	2/26/99	2/26/99
6 I-5 Palomar Airport Road	Procurement	Bio Strip	KLI	3/99 ¹	3/99 ¹	3/99 ¹	3/99 ¹
7 Carlsbad MS	Procurement	Bio Strip/IT	KLI	2/19/99	2/19/99	2/26/99	2/26/99

¹ Equipment installation schedule is dependent upon resolution of outstanding issues and construction schedule.

² Site operational means BMP is ready to receive stormwater runoff, not necessarily ready for monitoring.

Caltrans BMP Pilot Program Construction Estimate of Project Completion



DISTRICT 11 SUMMARY

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	State Furnished Material (Salt Grass)	Est. Final Cost Including CCO and State Furnished Materials
1 I-5/SR-56	9-14-98	11-18-98	12-31-98	\$130,739	\$10,000 Spillway excavation \$7,100 Import borrow \$1,300 Access road \$1,500 Flume Total \$19,900	N/A	\$150,639
2 I-15/SR-78	9-14-98	11-18-98	12-31-98	\$80,000	(\$240,500) Concrete lining deletion \$1,014,000 Remove man made buried obj. & construction of BMP at forced account \$1,500 Flume Total \$775,000	N/A	\$,855,000
3 I-5/La Costa	9-14-98	11-18-98	N/A	\$ 208,221	\$29,400 Removal of unsuitable material \$2,000 Removal of unsuitable material \$400 Flagging Total \$31,800	N/A	\$240,021
1 Kearney Mesa MS	11-10-98	12-17-98	2-26-99	\$298,797	\$6,300 Additional canisters \$15,000 Bedrock/Site Revision Total \$21,300	N/A	\$ 320,097
2 Escondido MS	11-2-98	12-23-98	2-26-99	\$490,405	(\$46,000) Substitution with epoxy coated \$5,000 add guard posts \$2,000 Elect Conduit Total (\$39,000)	N/A	\$451,405
3 La Costa Park & Ride	9-16-98	11-2-98	3-1-99	\$ 208,955	\$20,000 Unsuitable materials excavation \$8,000 Storm drain extension (\$15,000) Delete electrical conduit \$5,500 Safety Railing/Steps Total \$18,500	N/A	\$227,455
4 SR-78/I-5 Park & Ride	9-23-98	11-16-98	3-3-99	\$ 224,502	(\$14,000) Revised vault location \$5,000 plant establishment \$4,500 Safety railing \$2,000 Manhole \$1,000 Fence \$8,200 Landscaping & Irrigation Sys. Total \$6,700	N/A	\$231,202
5 Melrose Ave/SR-78	10-7-98	11-19-98	2-26-99	87,038	\$5,000 Unsuitable material \$19,000 Salt grass installation \$11,000 Plant establishment \$4,500 Storm Drain Sediment (\$2,500) Delete Seed \$1,500 Flume Modifications Total \$38,500	\$30,889	\$156,427
6 I-5 Palomar Airport Road	1-18-98	4-1-99	N/A	\$114,200	\$10,000 Plant Estab. & Temp. Irrigation	\$17,951	\$142,151
7 Carlsbad MS	10-12-98	11-19-99	2-26-99	\$157,800	\$20,000 Unsuitable subgrade \$8,000 Install salt grass \$5,000 Additional paving \$2,000 Elect. Conduit \$5,000 Infiltration Trench (\$18,400) Delete bio swale bid item \$5,500 Plant Establishment \$1,500 Flume Modifications Total \$28,600	\$9,792	\$196,192

SUBTOTAL (SITES UNDER CONSTRUCTION)		\$2,000,657	\$911,300	\$58,632	\$2,970,589
I-5/Manchester (East)	Engineer's Estimate =				\$ 350,000
I-5/La Costa	Engineer's Estimate =				\$ 735,000
GRAND TOTAL					\$4,055,589

DISTRICT 7 SUMMARY (ESTIMATED COMPLETION DATES ARE UNDER REVIEW BY CALTRANS)

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Amount	Estimated Contract Change Orders	Anticipated Additional Shoring Cost (Under Neg.)	State Furnished Materials (Salt grass)	Estimated Final Cost Including CCO and State Furnished Materials
1 I-605/SR-91	11-6-98	1-13-99	3/19/99	\$255,646	\$17,000 Asphalt Concrete \$2,000 Traffic Control \$1,000 Lead Sampling \$2,000 Maintain Elec. Sys \$1,000 Rem. Buried Objects \$2,900 Grading Revision (\$25,200) Grading Revision Total \$700		N/A	\$256,346
1 I-5/I-605	11-4-98	1-6-99	3-12-99	\$119,511	\$1,500 Traffic Control \$1,000 Lead Sampling \$155 Inlet Drain Holes Total \$2,655		N/A	\$122,166
2 I-605/SR-91	11-4-98	1-6-99	3-12-99	\$119,511	\$1,500 Traffic Control \$1,000 Lead Sampling \$155 Inlet Drain Holes Total \$2,655		N/A	\$122,166
1 Alameda MS	12-18-98	1-27-99	4-2-99	\$172,049	N/A		N/A	\$172,049
2 Eastern MS	9-25-98	12-8-98	3-12-99	\$267,570	\$16,000 Utilities	\$47,670	N/A	\$331,240
3 Foothill MS	10-1-98	1-4-99	3-12-99	\$400,647	N/A	\$68,955	N/A	\$469,602
4 Termination Park & Ride	10-1-98	12-21-98	3-18-99	\$372,982	\$4,500 Utilities	\$66,132	N/A	\$443,614
6 Via Verde Park & Ride\	10-8-98	1-15-99	4-2-99	\$309,633	\$17,400 Boulder coring \$400 Utilities Total \$17,800	\$39,663	N/A	\$367,096
8 Lakewood Park & Ride	12-4-98	2-4-99	3-29-99	\$388,037	N/A	\$57,150	N/A	\$445,187
1 Package 1 Altadena	10-5-98	12-18-98	3-12-99	\$197,574	N/A		\$3,673	\$201,247
6 Package 1 Foothill	10-5-98	12-18-98	1-8-99	\$67,730	N/A		N/A	\$67,730
7 Package 1 Las Flores	10-5-98	12-18-98	1-8-99	\$81,431	N/A		N/A	\$81,431
8 Package 1 Rosemead	10-5-98	12-18-98	1-8-99	\$59,390	N/A		N/A	\$59,390
2 Package 2 I-605/SR-91	11-30-98	1-29-99	3-12-99	\$166,715	(\$8,000) Reduced topsoil (\$1,500) Cancel Light Pole Reloc. Total (\$9,500)		\$20,812	\$178,027
3 Package 2 Cerritos MS	11-30-98	1-29-99	3-12-99	\$57,727	N/A		\$1,225	\$58,952
4 Package 2 I-5/I-605	11-30-98	1-29-99	3-12-99	\$124,575	(\$35,000) Delete Maintenance Pullout		\$7,344	\$96,919
5 Package 2 I-605/ Del Amo	11-30-98	1-29-99	3-12-99	\$119,895	N/A		\$4,285	\$124,180
SUBTOTAL (SITES UNDER CONSTRUCTION)				\$3,280,623	(\$190)	\$279,570	\$37,339	\$3,597,342

I-210/East of Orcas Ave	Engineer's Estimate =	\$100,000
I-210/East of Filmore St.	Engineer's Estimate =	\$100,000
Paxton P&R	Bid Amount (to be renegotiated) =	\$349,741
Metro MS	Bid Amount (to be renegotiated) =	\$532,302
GRAND TOTAL		\$4,679,385

OMM PLAN ACTIVITIES

VOLUME I

The final version of OMM Vol I has been submitted on January 15, 1999. The supplemental section for the Wet Basin is approximately 95 percent complete. March 8 1999 is the target date for submittal of the draft of the Wet Basin maintenance guidance to the plaintiffs.

VOLUME II

Comments on the OMM document was received from NRDC, EPA, and Baykeepers on December 8, 1998. The authors have reviewed and responded to the comments and appropriate changes have been made to the documents. The final version of OMM Volume II was submitted to the Plaintiffs on Feb 1, 1999. The final version of the Volume II was distributed to all plan holders.

Work on the Manchester EDB and the La Costa Wet Basin Field Guidance Note Books and Appendices is expected to begin about March 22. Plaintiff review of the Vol II documents is expected to begin May 14.

MAINTENANCE/OPERATIONAL THRESHOLDS

A threshold document is being prepared to provide focus on monitoring needs which trigger maintenance actions or operational concerns. Preventive and routine maintenance is focused on those activities which are needed to keep the BMPs operating within design parameters. Corrective maintenance is focused on those activities which are needed to correct those things which result from damage or other unplanned activities.

OTHER ISSUES

Water Quality Analysis: Monitoring, including water quality monitoring needs are under review. The report is expected end of March 1999.

OVERVIEW OF STORM EVENT MONITORING

Stormwater monitoring of the BMPs are performed by MW/Law Crandall and Brown and Caldwell for sites in District 7. Monitoring of the District 11 sites are performed by KLI.

Of the 27 sites (completed or currently under construction) in both districts, installation of equipment as been completed at 21 sites. Monitoring at sites where salt grass are installed has been suspended since the coverage and condition requirements have not been met. The remaining sites are awaiting the installation of monitoring equipment. Schedules for installation of equipment are summarized in a table on page 32.

Dates of stormwater sampling events are summarized in the table on page 41. Appendix B contains more detailed information on the storms monitored, as well as a technical memorandum on the Catch Basin Inserts for which there are significant problems.

District 7 – Sites Monitored by Montgomery Watson/ Law Crandall

To date, three storm events have been chased at the Catch Basin Insert sites (three locations, six separate drain inlet filters). The dates of successful monitoring events are listed in the table on page 41.

Monitoring equipment has been installed at all 9 sites monitored by MW/Law. All the sites monitored by MW/Law are ready to capture storm events (with the exception of sites where salt grass is installed). A summary of the dates of storm event captured is provided in a summary table at the end of the section. Appendix B contains a technical memorandum regarding concerns with the catch basin inserts being monitored by Law Crandall. The memorandum describes the observations that the stormwater runoff was bypassing the Fossil Filters and StreamGuard CBIs.

District 7 - Sites Monitored by Brown and Caldwell

No storm events have been monitored to date. Of the sites monitored by Brown and Caldwell, 3 of the 8 sites are ready for monitoring. The sites ready for monitoring consist of two EDBs and a Media Filter. The remaining 5 sites are currently under construction. Installation of equipment at these sites is scheduled after completion of construction – by early April 1999.

District 11 – Sites Monitored by KLI

The monitoring equipment has been installed at 9 of the 10 sites monitored by KLI (District 11 sites). The projected date for equipment installation at the remaining site, the Palomar Airport Biofiltration strip, is April 1999 (approximate construction completion date).

Two storm events have been captured at the PSE sites (EDBs at I5/56 and I15/78 and IB at LaCosta). The first rain event occurred on January 25-26, 1999 and was monitored successfully at all three sites, including empirical observations and site inspections before and after the event. A second storm on February 5 was also monitored successfully; empirical observation and site inspection were also carried out. A summary of the dates of storm event captured is provided in a table on page 41.

Monitoring of the La Costa infiltration basin site is currently being conducted by RBF for water level and vector presence only. KLI is not active at this site.

RBF/Caltrans is preparing a report for the Plaintiffs relative to the operation of and options for the Carlsbad Infiltration trench. This site is not performing relative per the original design criteria, with water remaining in the trench for several weeks following a storm. Consultation was made with the project geotechnical engineer, design engineer and construction manager for possible options to correct the poor infiltration performance. The report will be submitted to the Plaintiffs on March 9.

DATES OF SAMPLING EVENTS - 1999

Location	Project Type	BMP Type	Monitor Consultant	Event 1	Event 2	Event 3	Event 4
DISTRICT 7							
1 I-605/SR-91	PSE	IB	MW/Law				
1 I-5/I-605	PSE	EDB	BC				
2 I-605/SR-91	PSE	EDB	BC				
1 Alameda MS	Procurement	OWS	BC				
2 Eastern MS	Procurement	MF	BC				
3 Foothill MS	Procurement	MF	BC				
4 Termination Park & Ride	Procurement	MF	BC				
6 Via Verde Park & Ride	Procurement	MCTT	BC				
8 Lakewood Park & Ride	Procurement	MCTT	BC				
1 Package 1 Altadena	Procurement	Bio Strip	MW/Law				
		Infiltration Tr	MW/Law				
6 Package 1 Foothill	Procurement	CBI north-Stream Guard Insert	MW/Law	Feb 9			
		CBI south-Fossil Filter Insert	MW/Law	Jan 25	Feb 9		
7 Package 1 Las Flores	Procurement	CBI north-Stream Guard Insert	MW/Law	Jan 31	Feb 9		
		CBI south-Fossil Filter Insert	MW/Law	Jan 25	Jan 31	Feb 9	
8 Package 1 Rosemead	Procurement	CBI north-Fossil Filter Insert	MW/Law	Jan 31	Feb 9		
		CBI south-Stream Guard Insert	MW/Law	Jan 31	Feb 9		
2 Package 2 I-605/SR-91	Procurement	Bio Strip	MW/Law				
		Bio Swale	MW/Law				
3 Package 2 Cerritos MS	Procurement	Bio Swale	MW/Law				
4 Package 2 I-5/I-605	Procurement	Bio Swale	MW/Law				
5 Package 2 I-605/ Del Amo	Procurement	Bio Swale	MW/Law				
DISTRICT 11							
1 I-5/SR-56	PSE	EDB	KLI	Jan 25 to 26	Feb 5		
2 I-15/SR-78	PSE	EDB	KLI	Jan 25 to 26	Feb 5		
3 I-5/La Costa	PSE	IB	KLI	Jan 25 to 26	Feb 5		
1 Kearney Mesa MS	Procurement	MF (Comp)	KLI				
2 Escondido MS	Procurement	MF	KLI				
3 La Costa Park & Ride	Procurement	MF	KLI				
4 SR-78/I-5 Park & Ride	Procurement	MF	KLI				
5 Melrose Ave/SR-78	Procurement	Bio Swale	KLI				
6 I-5 Palomar Airport Road	Procurement	Bio Strip	KLI				
7 Carlsbad MS	Procurement	Bio Strip	KLI				
		Infiltration Tr	KLI				

VECTOR ACTIVITIES

Monitoring:

The field activities associated with the background monitoring study have been completed. A report on the background monitoring has been completed. A copy of the report is enclosed as Appendix C. Trapping of adult mosquitoes was carried out at all BMP sites in early February. No activity was found at most of the sites.

Vector Activity:

Vector activity has been noted in at least three BMP sites on two occasions in District 7. Greater Los Angeles County Vector Control was notified of this activity. Vector activity was noted at District 7 EDB at I-5/I-605 on Feb 22. Mosquito egg rafts (approx. one dozen) were found associated with the outflow from the standpipe. Samples of the egg rafts were returned to UC Riverside and the larvae were reared for identification. Larvae was identified as *Culex quinquesfasciatus* and *Culex tarsalis*. Both species potentially carry diseases. The Vector Control District has been notified. Vector activity was also found at I-5/I-605 south EDB and the Cerritos MS biofiltration swale on Feb 23. A sample of egg rafts were obtained at Cerritos MS biofiltration swale.

Department of Health Services Agreement:

The MOU/Contract between DHS and Caltrans was signed by DHS the week of 2/15. Caltrans acknowledged the receipt of the contract on 2/22. It will be signed and forwarded to General Services sometime during the week of 3/1. This agreement will allow DHS to hire a full-time biologist to coordinate the monitoring effort of the VCDs and assist with data management and analysis. It is anticipated that a biologist will be selected by April.

Service Agreements D7:

All three vector control districts have received their respective service agreements. Unfortunately, due to the scheduling of various vector related conferences and workshops the Districts have not yet executed the agreements. It is anticipated that meetings to finalize any remaining issues will take place in early March. The Greater Los Angeles Vector Control District and the San Gabriel Valley Vector Control District will likely submit the agreements for approval to their respective Boards of Directors in mid-March. It is also anticipated that district

representatives will tour the BMP sites sometime in early March. Copies of the draft service agreements with the Vector Control Districts in District 7 are provided in Appendix D.

Service Agreement D11:

County representatives were given a tour of District 11 BMP sites on 2/11. No sign of vector activity was seen on this field trip. Dean Messer, Pat Kinney, Marcelo Peinado and Bill Whittenberg met with representatives of the Vector Surveillance and Control Division on 2/12 and discussed minor changes to the scope of the service contract. It is expected that the contract will be presented to the County Council as a consent item and should be approved by the council in the near future (scheduled vote on March 16).

DISTRICT 7 PROCUREMENT DESIGN ACTIVITIES

The District and the plaintiffs have reached a tentative agreement on the Statement of Understanding. The design works are proceeding based on the agreement.

Stormtreat System at Paxton or Termination PR

The stormtreat system has been found unfeasible for typical Caltrans Facilities due to its limited flow capacity, 1-2 gpm, and other limitations. The District has determined that it is not viable to implement the device as a pilot.

Paxton PR: Because of the unfeasibility of Stormtreat System, the District has decided to resume construction for the media filter at Paxton Park and Ride. The design package is being reviewed.

Metro MS: Redesign is underway to minimize the structural impact from the adjacent bridge columns. It seems that with the relocation of the pump and reconfiguration of the settling chamber, the construction will be kept outside footing surcharge areas. Preliminary schedule is not available but it is anticipated that the construction will be completed before 10/15/99.

CDS: The District has resumed the design for Continuous Deflection Separation Units (CDSs) at Site 1, located at I-210 East of Orcas Avenue and Site 2, located at I-210 East of Filmore Street. The systems are anticipated to be in construction 8/15/99 and ready for operation before 10/15/99.

DISTRICT 11 PS&E DESIGN

Project 4 – Wetpond: I-5 (N/B)/La Costa Avenue

The design process has transitioned from a Procurement process to a PS&E process. The Plaintiffs have completed review of the design plans, and response to comments have been provided. The design report and the plans and specifications have been completed, reviewed on 2/25/99 and forwarded to Caltrans Headquarters Office of Engineering for processing.

Environmental clearances have been obtained and a Categorical Exemption has been received. The wetpond will be constructed during the spring season.

Schedule of the project are as follows: Advertise on March 10, Award on March 24, and construction to begin on the March 29. Construction is scheduled for a 45-day period. Depending on weather, anticipated completion of construction will be end of May or early June 1999. A detailed schedule is provided in Appendix E.

It's anticipated that approximately six mature trees will be removed during construction. These trees will be replaced at the 5:1 ratio, and the new bushes and shrubs planted. To ensure the quality of the critical vegetation delivered to the site, the bushes and shrubs for the basin will be preselected at the nursery. The replacement cost is approximately \$12,000 (\$400/tree).

Monthly monitoring of groundwater level continues. A groundwater level reading is summarized in a table at the end of the section.

Project 1, Site 2 – Extended Detention Basin: I-5 (NB)/Manchester Avenue

The design process has transition from a Procurement process to a PS&E process. The Plaintiffs have completed review of the design plans, and response to comments have been provided. The project will be conducted as a change order to the existing PS&E contract with Excel Constructors. The design report and the plans and specifications were completed and a CCO will be processed for execution.

Environmental clearances have been obtained.

Construction is scheduled to begin March 15. A detailed schedule is provided in Appendix E.

Monthly monitoring of groundwater level continues. A groundwater level reading is summarized in a table below.

Groundwater Level Monitoring – Elevation (ft)		
Date	La Costa – WB site	Manchester – EDB site
12/15/98	13.80	13.00
1/20/99	13.75	13.12
2/26/99	14.00	12.58
Basin Invert	9.84	14.58

ENVIRONMENTAL ISSUES

Regulatory Issues

RBF continues to coordinate with a Dudek & Associates, a San Diego based biologist to establish a scope of work to perform a Biological Monitoring Assessment/Survey of the BMP sites during the extent of the study. Dudek will be monitoring the sites and documenting their effect on wildlife communities. A site visit to all D11 sites with Dudek was conducted on 2/11.

WEATHER

Precipitation data for Los Angeles and San Diego for the month of January and February was obtained from NOAA (see Table, below). Bolded data below indicates successful storm event monitored.

January 1999

Los Angeles – Civic Center				San Diego			
Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)
1	0.00	16	0.0	1	0.00	16	0.0
2	0.00	17	0.0	2	0.00	17	0.0
3	0.00	18	0.0	3	0.00	18	0.0
4	0.00	19	0.12	4	0.00	19	0.12
5	0.00	20	0.0	5	0.00	20	0.08
6	0.00	21	0.0	6	0.00	21	0.0
7	0.00	22	0.0	7	0.00	22	0.0
8	0.00	23	0.0	8	0.00	23	0.0
9	0.00	24	0.37	9	0.00	24	0.70
10	0.00	25	0.42	10	0.00	25	0.23
11	0.00	26	0.30	11	0.00	26	0.31
12	0.00	27	0.0	12	0.00	27	N/A
13	0.00	28	0.0	13	0.00	28	N/A
14	0.00	29	NA	14	0.00	29	0.0
15	0.00	30	0.0	15	0.00	30	0.0
		31	0.56			31	0.06

February 1999

Los Angeles – Civic Center				San Diego			
Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)
1	0.0	16	0.0	1	0.0	16	0.0
2	0.0	17	0.0	2	0.0	17	0.0
3	0.0	18	0.0	3	0.0	18	0.0
4	0.0	19	0.0	4	0.34	19	0.0
5	0.17	20	0.0	5	0.22	20	0.0
6	0.0	21	0.0	6	T	21	0.0
7	0.0	22	0.0	7	0.0	22	0.0
8	0.0	23	0.0	8	0.02	23	0.0
9	0.27	24	0.0	9	0.0	24	0.0
10	0.12	25	0.0	10	0.09	25	0.0
11	0.0	26	0.0	11	0.0	26	0.0
12	0.0	27	0.0	12	0.0	27	0.0
13	0.0	28	0.0	13	0.0	28	0.0
14	0.0			14	0.0		
15	0.0			15	T		

The data presented here is as an indicator only. Consequently, the actual rainfall at the sites will vary from the indicator site. The data presented above for Los Angeles is as of 4:00 p.m. is for the preceding 24 hours. The data presented above for San Diego is as of 5:00 p.m. is for the preceding 24 hours.

APPENDIX A

MEETING MINUTES No. 3



Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

JN: 34123, 34218

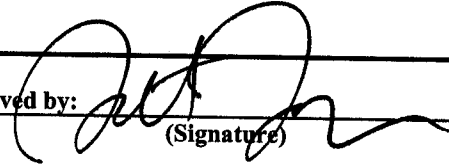
STORMWATER PLANNING SERVICES
CONTRACT NO. 43A0004A
Meeting Minutes

ISSUE VERSION: FINAL

MEETING NO.: 3
DATE: December 8, 1998
TIME: 8:00 AM
LOCATION: Dist. 11 Traffic Ops.

SUBJECT: Status Meeting No. 3, Decision Point No. 2

Prepared by: S. Taylor

Approved by: 
(Signature)

Date Prepared: 1/4/99

Attendee Names / Affiliation

Steve Borroum/Caltrans
Cid Tesoro/Caltrans
Marcelo Peinado/Caltrans
Brian Currier/Caltrans
Jim McCarthy/Caltrans
Howard Yamaguchi/Caltrans
Bob Wu/Caltrans
Jeremy Johnstone/EPA
Chris May/NRDC
Rich Horner/NRDC
Everett DeLano/NRDC
Rick Graff/SD BayKeeper
John Barth/SD BayKeeper

Attendee Names / Affiliation

Bill Whittenberg/RBF
Anna Lantin/RBF
Scott Taylor/RBF
Jerome Ruddins/RBF
Gary Conklin/RBF
Mike Barrett/RBF
Dean Messer/LWA
Gary Friedman/MW-C
Bob Finn/BC

Copies To:

File

The following items presented summarize the substantive items discussed or issues resolved at the above meeting to the best of the writer's memory.

MEETING MINUTES

Meeting Date: December 8, 1998

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ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
01	Caltrans and the Plaintiffs indicated the desire to keep the Pilot Program an open process between the two parties, and to continue to develop effective communication on significant project issues.	FYI			
02	It was decided that Caltrans would further develop the cost accounting system for the Pilot Program and work with the Plaintiff so that the system was consistent with their expectations.	New	12/8	Ongoing	Caltrans
03	The Plaintiffs indicated that they did not feel that any pilots are ready to monitor at this time. There was agreement that Caltrans could bring each site 'on line' and begin monitoring as construction was finished without further field review of the site by the Plaintiff. The Plaintiff noted they may visit the sites as their schedule permits over the next few months.	New	12/8	Ongoing	Caltrans
04	RBF reviewed the construction status of each of the projects in both District 11 and District 7.	FYI			
05	Plaintiff asked if the filters could be pre-cast for Delaware and Austin units. Caltrans indicated this was not possible due to the size of the units.	FYI			
06	Caltrans reviewed the construction budget for both District 11 and District 7. Currently, construction costs are projected to be over the original budget in both Districts.	FYI			
07	Plaintiff noted that a cost estimate for seed should be developed since we had only developed a prototype cost for sod. Caltrans agreed to develop this cost.	New	12/8	3/99	Caltrans/RBF
08	A discussion followed relative to the construction cost of the Pilots. It was noted that on the CBI,s 90% of costs are for monitoring, construction of new inlets, manholes, etc. However, on other units, such as detention facilities and filters, the relatively high costs appeared to be due to the retrofit nature of the work, i.e., single projects not in close proximity to each other, difficult working conditions due to traffic control and Caltrans operations, unforeseen field conditions.	FYI			
09	OMM Plan Comments were distributed by the Plaintiff. Plaintiff indicated that the OMM plan was ready to be used as the pilot projects were brought on line for monitoring, but that the manuals should be refined further in accordance with the comments provided. Caltrans to review Plaintiff comments and respond.	New	12/8	1/99	Caltrans/RBF
010	Caltrans provided an update on interface with the Vector Control Districts. San Diego vector control will now be handled by the County instead of Caltrans at the County's request. In LA and San Diego, service agreements will be signed between the Consultants and the vector agencies rather than an MOU between Caltrans and the Agencies. It was noted that the timing of the MOU would not fit with the project schedule.	New	12/8	1/99	BCC/MW-C/KLI
011	The schedule for the Manchester EDB and the La Costa south Wet pond was discussed. Caltrans indicated that these projects may not be delivered by the June 30 1999 deadline in the consent decree, primarily due to regulatory issues, but that every effort was being made to deliver the projects by the deadline.	FYI			
012	A discussion was also held relative to the Palomar Airport Road bioswale. It was noted that construction of the swale may require the removal of existing trees, which would have to be mitigated at a ratio of 5:1	New	12/8	1/99	Caltrans/RBF

MEETING MINUTES

Meeting Date: December 8, 1998

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ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	per the project Coastal Development Permit. Caltrans is looking for alternatives to this since the District has a commitment with the City of Carlsbad to finish work in the area by 3/99.				
013	Following the meeting, a field trip was held for site review in both District 11 and District 7 over the next day and a half.	FYI			

APPENDIX B

MONITORING ACTIVITIES SUMMARY TABLES AND MEMOS

Sites Monitored by Law Crandall (2/26/99)

	Site ID: 073216	Site ID: 073216	Site ID: 073216	Site ID: 073217	Site ID: 073217	Site ID: 073218	Site ID: 073218
	Foothill MS, north CBI monitoring station (effluent from StreamGuard Insert)	Foothill MS, south CBI monitoring station (effluent from Fossil Filter Insert)	Las Flores MS, north CBI monitoring station (effluent from StreamGuard Insert)	Las Flores MS, south CBI monitoring station (effluent from Fossil Filter Insert)	Rosemead MS, north CBI monitoring station (effluent from Fossil Filter Insert)	Rosemead MS, south CBI monitoring station (effluent from StreamGuard Insert)	
	Sampled	Observations	Total Precipitation	Sampled	Observations	Total Precipitation	Sampled
Date of Storm Event	Sampled	Observations	Total Precipitation	Sampled	Observations	Total Precipitation	Observations
25-Jan-99	(1) v	0.49	0.49	(1) v	0.25	0.41	v
31-Jan-99	(2)	0.35	0.35	(1) v	0.48	0.42	v
9-Feb-99	(3) v	0.54	0.54	(3) v	0.29	0.44	v
Total Events Sampled	1		2	3		2	2

1) Sample collected and analyzed, percent storm capture below 70%.

2) Inserts were removed in accordance with the OMM Plan and were in the process of being replaced.

3) Sample collected but deemed not representative of storm.

Note:

Visual observation of the Fossil Filter inserts indicate stormwater bypass (overflow) during low flow conditions.

Stormwater bypass occurred despite removing debris from the top of the absorbent filter cartridge.

Visual observations of sediment in the downstream monitoring vaults indicate that sediment is bypassing both the Fossil Filter and StreamGuard inserts.

Sites Monitored by Kinnetic Laboratories (2/26/99)

Site ID: 111103				Site ID: 111102				Site ID: 111101				
Date of Storm Event	LaCosta Infiltration Basin				I-15/78 Extended Detention Basin (Inlet & Outlet)				I-5/56 Extended Detention Basin (Inlet & Outlet)			
	Sampled	Observations	Total Precipitation	Total Events Sampled	Sampled	Observations	Total Precipitation	Total Events Sampled	Sampled	Observations	Total Precipitation	Total Events Sampled
25-Jan-99	v	v	1.00	1	v	v	1.20	1	v	v	1.17	1
31-Jan-99	(1)	v	0.14	1	(1)	v	0.19	1	(1)	v	0.12	1
5-Feb-99	v	v	0.54	2	v	v	0.36	2	v	v	0.48	2

1) False Alarm. Insufficient rain to monitor BMP.

[illegible]

Stormsum.xls, Installation

[illegible]

Stormsum.xls, Monitoring

Memorandum

Date: February 26, 1999

To: Brian Currier

Cc: Gary Friedman
Bob Wu

From: Ed Othmer

RE: Caltrans BMP Retrofit Pilot Program – Catch Basin Insert Installation Requirements and Performance

As part of the Caltrans BMP Retrofit Pilot Program, StreamGuard™ and Fossil Filter™ catch basin inserts (CBIs) have been installed at the Foothill, Rosemead, and Las Flores Maintenance Stations. This memorandum documents the installation requirements and the initial performance of the CBIs.

Installation of both types of CBIs was performed in accordance with the manufacturer's recommendations. However, because it was evident that stormwater discharge would circumvent some of the CBIs, specific field modifications were taken during their installation to promote flow through them. The field modifications used were simplistic and were not intended to be disproportionate when compared to the manufacturer's installation procedures. Table 1 summarizes the specific field modifications that were performed and also describes deviations noted in materials used by the manufacturer in the fabrication of the CBIs.

The performance of the CBIs is based on visual observations during and after three storm events that occurred in January and February 1999. In some instances, observations indicated that stormwater runoff was bypassing the Fossil Filter's™ adsorbent media and overflowing through its overflow area. Observations of sediment in downstream monitoring vaults also indicated that sediment was bypassing the StreamGuard™ and Fossil Filter™ CBIs. Based on these observations, both StreamGuard™ and Fossil Filter™ representatives were contacted to discuss the observations.

On 22 February 1999, Mr. Gary Friedman (Montgomery Watson) contacted Mr. John McPherson (Emcon, a StreamGuard™ distributor) to discuss the performance of the StreamGuard™ CBI. Mr. McPherson said that the StreamGuard™ CBI was originally designed to remove heavy solids from construction sites and that it was not designed to remove micron-sized particles from stormwater discharge.

On 24 February 1999, Mr. Ed Othmer (LawCrandall) and Mr. Chuck McKinley (Maintenance Products Inc., a Fossil Filter™ distributor) visited the Foothill, Rosemead, and Las Flores Maintenance Stations. Mr. Bob Wu (Caltrans) also visited the Rosemead Maintenance Station. Mr. McKinley evaluated the condition of the Fossil Filter™ CBIs to determine the cause of overflow. It was determined that debris, which collects on top of the adsorbent filter cartridge, impedes flow through the filter and causes the flow to discharge through the CBI's overflow area. Mr. McKinley stated that the Fossil Filter™ CBI installed at the Rosemead Maintenance Station would be impacted by debris from the storage bay area. Based on conversation with Mr. McKinley and Fossil Filter™ literature, additional maintenance, beyond what is generally recommended (i.e., once before and twice during the rainy season), would be required to keep the adsorbent filter cartridge free of the debris.

At Foothill Maintenance Station, Mr. McKinley confirmed that Mr. Othmer had correctly replaced the adsorbent material three days earlier. Mr. McKinley suspected that the Fossil Filter™ CBI would function properly. Subsequent to the field visit, Mr. Byron Berger (LawCrandall) informed Mr. Othmer that, despite the Fossil Filter™ being relatively free of debris for the first storm event, discharge was observed bypassing the adsorbent filter because the adsorbent filter could not percolate the discharge fast enough.

While at the Las Flores Maintenance Station, Mr. Othmer and Mr. McKinley tested the hydraulic performance of the Fossil Filter™ CBI. This was done by discharging water to the CBI by use of a hose. The hose discharged water at a rate of approximately 5-10 gallons per minute. Shortly after the flow reached the Fossil Filter™ CBI, leaves, which had collected on top of the filter cartridge, impeded the flow through filter and caused the flow to discharge through the CBI's overflow area. The problem was corrected by removal of the leaves. Mr. McKinley stated that the Fossil Filter™ CBI installed at the Las Flores Maintenance Station would be impacted by leaves from nearby trees. Based on conversation with Mr. McKinley and Fossil Filter™ literature, additional maintenance, beyond what is generally recommended (i.e., once before and twice during the rainy season), would be required to keep the adsorbent filter cartridge free of the leaves.

In summary, it appears that sediment either bypassed the StreamGuard™ CBI through small openings between the insert and the drain inlet box or from the passing of micron-sized particles through the StreamGuard™ CBI. It was also determined that discharge bypassed the Fossil Filter™ CBI because debris, which collected on top of the adsorbent filter cartridge, impeded flow through the CBI's filter. In one instance, discharge bypassed the Fossil Filter™ CBI because the adsorbent material could not percolate the discharge fast enough.

APPENDIX C

REPORT ON VECTOR CONTROL MONITORING

***REPORT ON VECTOR CONTROL BACKGROUND
MONITORING FOR CALTRANS RETROFIT BMP
PILOT PROJECT SITES IN DISTRICT 7 AND
DISTRICT 11***

February 9, 1999

William E. Walton

Department of Entomology, University of California, Riverside, CA 92521

EXECUTIVE SUMMARY

A background monitoring study was undertaken to determine the abundance of adult host-seeking and gravid mosquitoes, as well as non-biting midges, at Caltrans Stormwater Best Management Practices (BMP) locations within Los Angeles County (Caltrans, District 7) and San Diego County (Caltrans, District 11) prior to stormwater device operation. From July through December 1998, two trap types (carbon dioxide-baited light traps and gravid traps) were used to assess the abundance and species composition of potentially pestiferous or pathogen-transmitting flies at each BMP site. Gravid (egg-laying) mosquitoes were collected at all sites. At some sites, nightly collections were greater than 100 individuals. The ubiquity and abundance of gravid mosquitoes indicated a strong potential for colonization of standing water at BMP sites. Egg-laying mosquitoes were three-fold and ten-fold more abundant than host-seeking mosquitoes in District 11 and 7, respectively. Fewer than 6 host-seeking mosquitoes were collected per night at most of the sites. The trends for abundance of mosquitoes in carbon dioxide-baited light traps indicate that host-seeking adults at the BMP sites did not show a strong seasonal trend across sites; the trends suggest that the abundance of mosquitoes was influenced more strongly by local conditions than by regional, large-scale environmental factors. Gravid mosquitoes showed two peaks of activity, during August and again in October, particularly at the San Diego sites. Species composition of the host-seeking and gravid mosquitoes was predominated by the southern house mosquito, *Culex quinquefasciatus*, a potential vector of St. Louis encephalitis virus in urban environments. Collections from District 7 contained fewer mosquito species (6) than did those from District 11 (9 species). In addition to *Culex* species which prefer enriched standing water, the San Diego sites had proportionately more *Aedes* and *Anopheles* than did the Los Angeles sites and indicate a greater potential for mosquito production from intermittently inundated habitats where water is present for more than one week. Within District 7, the five Pacoima sites exhibited the greatest mosquito diversity, indicative of the comparatively diverse land use patterns surrounding those BMP sites. The species composition of mosquitoes at the Las Flores MS site differed appreciably from the other District 7 sites. Catches in the two traps at all sites were independent; strong correlations were not found for comparisons of mosquito abundance in both traps either by date or by lagged (1 week or 2 week lags) dates suggesting that both trapping methods are necessary for monitoring the different components of adult mosquito populations. Midge abundance in carbon dioxide-baited light traps during summer and autumn was generally low (< 10 individuals per trap night), exhibited rare sporadic increases of abundance, and was significantly associated with host-seeking mosquito abundance across BMP sites within each of the two Caltrans districts. The trends for background levels of mosquito abundance and diversity indicate (1) the potential colonization of standing water at all BMP sites by gravid mosquitoes, particularly *Culex quinquefasciatus*, a vector of encephalitis virus in urban environments of California, (2) a generally low abundance of host-seeking mosquitoes and adult midges, and (3) appreciable differences of species composition between the Caltrans districts and among sites within each district. The differences in species composition are attributed to the comparatively more urbanized sites in District 7 versus the greater diversity of wetland habitats adjacent to sites in District 11, to the

localized effects of land use patterns surrounding BMP sites within each district, and, to a lesser extent, the geographical location of sites within southern California.

INTRODUCTION

Overview

Mosquito abatement is an important concern in southern California because the climate is amenable to mosquitoes and the pathogens that they can transmit for a large portion of the year. Biting flies such as mosquitoes are important vectors of pathogens that cause diseases in humans and domesticated animals. The diseases have a variety of causative agents (e.g., viruses, bacteria, protists). Fifteen of the twenty-two (22) arboviruses in California are known to be transmitted by biting flies to humans and other mammals in California (Reisen 1995); eight (8) of the viruses have been shown to cause febrile and central nervous system illnesses in humans (Reeves 1990). The rapid increase in the human population and the addition of new sources of standing water into a historically dry region creates the potential for disease transmission and nuisance biting by mosquitoes.

Each year, encephalitis virus transmission is detected in sentinel bird populations which are used as an early warning system of virus activity within urban and rural settings of the region (Reisen 1995, Kramer et al. 1996). Ongoing monitoring of wild bird populations in Orange County has indicated that the St. Louis encephalitis virus has been present every year since monitoring began in 1987 (Bennett et al. 1996). Mosquitoes that utilize storm drains, organically-enriched puddles and ponds, wetlands, etc., are capable of transmitting encephalitis viruses to humans and horses, as well as to birds. Although the last serious encephalitis outbreak among humans in southern California occurred in the mid-1980s, mosquitoes and other flies which originate from freeway and stormwater drainage systems, treatment wetlands, and from nearly any unmanaged source of standing water can become a nuisance to people. New or existing habitat that might produce large numbers of mosquitoes is a concern to the public agencies charged with vector control.

The adult population of mosquitoes can be separated into three groups based on behavior: (1) host-seeking, (2) gravid and (3) resting adults. Host-seeking adults are female mosquitoes that are actively seeking a blood meal which will serve as a protein source necessary for the development of eggs. In addition to a potential source of disease-causing pathogens, host-seeking individuals can be an annoyance to humans and to domesticated animals. Gravid mosquitoes are females that contain eggs and typically are collected as they search for sites to deposit their eggs, such as standing water. Except in rare instances where females of particular species can produce one group of eggs without blood feeding, the majority of gravid females will have taken at least one blood meal. Because more than one blood meal is required for the transmission of most disease-causing pathogens known in California, gravid females provide a more reliable means of assessing the prevalence of pathogens in the mosquito population than do host-seeking females. Resting individuals are usually a mixture of newly emerged females which have not taken a blood meal, recently blood-fed females which are digesting the blood prior to

egg production, and males (which do not blood feed). Resting individuals are often collected in comparatively dark and humid environs. Whereas, host-seeking and gravid females of many species are collected readily by luring individuals to traps, collection of resting mosquitoes is considerably more time consuming because individuals are not easily attracted to traps. The abundance of host-seeking females represents the potential for nuisance biting and pathogen transmission. The abundance of gravid females represents the potential for colonization of standing water and for pathogen transmission. Both components of adult mosquito populations are routinely monitored throughout California.

In addition to mosquitoes whose biting potentially creates discomfort and transmits disease-causing pathogens to humans, non-biting midges in the family Chironomidae can also be produced in substantial quantities from standing water. The immature stages of the midge life cycle occur in water. Even though adult midges do not blood-feed like mosquitoes, they can become a serious nuisance near wetlands, drainage channels, lakes, golf course ponds, etc. where adults are attracted to lights and subsequently alight on, or enter, human residences. Adult midges are very similar in appearance to mosquitoes and are also a concern for agencies charged with abating public nuisances.

Purpose/Objectives

As a result of litigation between the State of California Department of Transportation (Caltrans) and plaintiffs including the National Resources Defense Council (NRDC) and the San Diego Baykeeper, Caltrans is currently in the process of completing development of a Best Management Practice (BMP) Retrofit Pilot Program in Caltrans District 7 and District 11. During the summer and autumn of 1998, Caltrans commenced construction of devices to evaluate the efficiency of eleven (11) designs for improving the water quality of stormwater discharge at thirty-four (34) sites in southern California. Some of the proposed stormwater devices have the potential to produce vectors of human pathogens and nuisance insects. To document any change in site conditions that might enhance mosquito populations it was necessary to perform background monitoring. The purpose of background monitoring was to determine the relative abundance of adult host-seeking and gravid mosquitoes, as well as non-biting midges at Caltrans Stormwater Best Management Practices (BMPs) locations within Los Angeles County (Caltrans, District 7) and San Diego County (Caltrans, District 11) prior to stormwater device operation. The background monitoring program was designed to duplicate the trapping efforts included in the vector/nuisance insect monitoring programs under development for the operational BMPs. The data collected by the background monitoring program will permit comparison of insect abundance before and after the BMP devices are operational.

Sampling Overview

In order to evaluate the background levels of mosquito and midge populations at BMP pilot sites, a monitoring program was undertaken to sample the following:

- (1) host-seeking adult female mosquitoes by carbon dioxide-baited traps,
- (2) gravid female mosquitoes by gravid traps, and
- (3) adult midge populations by light traps.

The methods employed were similar to those planned for the BMP pilot sites after construction of the projects is completed. Larval surveys by dipping will be an important component of the post-construction mosquito monitoring program; however, because standing water was not present at the sites prior to and during construction, larval surveys by dipping could not be included in the background monitoring program. Monitoring adult mosquito and midge populations will be an important component of post-construction monitoring particularly at sites where larval monitoring is not feasible throughout the entire basin (e.g., wet basins) and in sites where standing water in the BMP might not be readily accessible to dip sampling (e.g., oil/water separators, freeway drains and associated catch basins). In the unlikely event that standing water is present, host-seeking mosquitoes attracted to a BMP site may create nuisance biting of humans. Adult monitoring is required to assess this potential.

Sampling Site Locations

The various BMP pilot sites were selected so that retrofit options allow for observations pertaining to technical feasibility, costs of retrofitting and benefits. Typical sites were selected along Caltrans' right-of-way, including interchanges, park and rides (P&R) and maintenance stations (MS). Each site for a retrofit pilot project was selected to be appropriate for the type of best management practice to be evaluated and without pre-judgment about the outcome of the associated retrofit pilot study. The specific retrofit BMP locations are described in Table 1 (District 7) and Table 2 (District 11) below. Selected BMP pilot sites are identified on Exhibit A within Appendix A and Exhibits A and B within Appendix A of the "BMP Retrofit Pilot Program: Vector Control Background Monitoring Plan (Mosquitoes and Midges)" for Caltrans District 7 (Caltrans 1998a) and District 11 (Caltrans 1998b), respectively.

Trap locations for vector control background monitoring used the same designations listed in Tables 1 and 2 except for Penasquitos sites 1 and 2 in District 11. These sites were designated as San Diego sites 11 and 12, respectively, in the Vector Control Background Monitoring Study (Table 2).

PROCEDURES

CO₂-Light Traps

In order to sample both mosquitoes and midges, carbon dioxide and ultraviolet light were combined as lures into a single suction trap. A miniature Centers for Disease Control (CDC) light trap with single 4-watt blacklight lamp (wavelength range: 320-420 nm in the near ultraviolet) was combined with a carbon dioxide source (dry ice). The top of the trap consisted of (i) an adapter and (ii) an insulated storage container for solid carbon dioxide

equipped with a manifold for delivering approximately 500 ml CO₂/min. Each CO₂-light trap was stocked nightly with approximately 2 kg of dry ice. The carbon dioxide sublimated above the fan and motor which provided suction to draw host-seeking mosquitoes into the collection chamber. In order to standardize the trapping period, each trap was equipped with a photoswitch and gate system that was activated at dusk and deactivated after sunrise. The gate closed and prohibited egress of adult flies from the trap after sunrise. Power was supplied by either rechargeable 6 V batteries or by an array of D-cells.

Gravid Traps

A modification of the Reiter-Cummings gravid trap was used to monitor the abundance of gravid (egg-laying) female mosquitoes. The upper component assembly (42 X 21 X 17 cm) included the motor, fan, intake and exhaust manifolds, power supply, electronics array and the collection chamber. The lower component was a heavy-duty beige plastic tray (approximately 20 X 38 X 13 cm) that served as a basin for an organic infusion and as a support for the upper component assembly. At each BMP pilot site, four liters of an organic infusion were added to the bottom of the gravid trap and then the top components of the trap were assembled and placed onto the trap's base. In order to standardize the trapping period, each trap was equipped with a photoswitch that was activated at dusk. The fan was deactivated upon collection of the trap on the following morning. Power was supplied by either rechargeable 6 V batteries or by an array of D-cells.

Each week a new infusion of oviposition medium was set up in a large plastic trash bin. The oviposition attractant consisted of 0.5 kg hay, 5 g dried brewer's yeast, 5 g lactalbumen and 114 liters of water aged for seven days. The mixture was covered, and left to incubate for 5 days out-of-doors. In order to keep water temperatures below 40°C, the infusion chambers were to be kept out of direct sunlight. Prior to use, the infusion was sieved (opening: ~0.6 cm) to remove floating debris. The coarsely filtered infusion was transferred from the infusion chamber into 20 liter Nalgene carboys for transport to the BMP sites.

Within each Caltrans district, a set of traps (one CO₂-light and one gravid trap) was run on the same night at each BMP pilot site location. Traps were typically run on Tuesday nights in District 7 and on Thursday nights in District 11. Traps were run weekly at each BMP pilot site from July 23 until October 31, 1998; and then biweekly until December 17, 1998. This sampling frequency represents weekly samples during the peak activity for mosquitoes in southern California and biweekly samples during the late autumn when host-seeking and reproductive activities normally decline. Trapping was not carried out during rain events when mosquitoes are not active; however, inclement weather was rare. For locations where more than one BMP device was planned (District 7 BMP sites 7, 11, 13), one set of traps was run.

Traps were placed as close to prospective sites of the BMP devices as possible so not to interfere with daily operations at Maintenance Stations (MS) and Park and Rides (P&R), and so not to be jeopardized by or interfere with construction of the BMP devices. Traps

were situated in comparatively sheltered locations, near vegetation or buildings. In addition to apprising Caltrans supervisors, superintendents and other personnel of monitoring activities, a schedule of monitoring activities and pictures of the traps were provided to regional law enforcement agencies such as County Sheriffs Departments and the California Highway Patrol.

Each trap carried a site-specific tag/label attached to the collection bag. At collection, the fine mesh bags containing mosquitoes and midges were placed into an insulated cooler, returned to the laboratory and killed by freezing. Freezing eliminated the need to use poisons (e.g., potassium cyanide) or other chemicals putatively harmful to humans (e.g., trichloroethylene) as a means of killing insects in the samples.

Mosquitoes were identified using Bohart and Washino (1978) and Meyer and Durso (1998). Midges were categorized as morphospecies and representative specimens were sent to a systematic expert for identification. Voucher specimens of all species collected during the background monitoring study are maintained at the Entomology Research Museum, University of California-Riverside.

Weather data

Daily weather data collected at five sites in Los Angeles County (Claremont, Glendale, Long Beach, Pomona, and Santa Monica), at two sites in San Diego County (Oceanside and San Diego) and at one site in Riverside County (Temecula) by the CIMIS (California Irrigation Management Information System, California Department of Water Resources) network were summarized. Temecula was the inland site closest to Escondido and was assumed to be most similar to conditions for the northeastern BMP sites in District 11. Daily maximum, minimum and average temperatures were examined. Seven day running averages for average daily temperature were computed for each site. Precipitation data were available for all sites except Claremont. Rainfall events > 2 mm (> 0.1 in.) were typically districtwide events; daily districtwide averages were calculated.

Analyses

For each type of trap, the number of mosquitoes collected at each BMP location were ranked and compared across time using a nonparametric repeated-measures analysis of variance (ANOVA). If the ANOVA was statistically significant ($P < 0.05$), then *a posteriori* comparisons (Student-Newman-Keuls test) between the medians for each BMP location were carried out to determine whether mosquito abundance at particular locations consistently differed relative to other BMP locations. Similar analyses were carried out for midge collections by the CO₂-light traps.

The similarities of host-seeking or gravid mosquito species composition among the sites were examined using ordination by principal components analysis. Principal components analysis is a heuristic technique for examining the relationships among a set of variables. Correlation matrices were calculated using the relative abundance of each species summed across time at each BMP site. The number of factors computed for each ordination was equal to the number of eigenvalues > 1 ; this value was ≤ 5 in all cases. Following initial

factor extraction, factor loadings for species were rotated in ordination space using a varimax rotation (Wilkinson and Stenson 1997). Factor scores were then used to examine the position of each BMP site in ordination space. The Hotelling T^2 statistic based on the squared standardized distance from each case (BMP site) to the centroid of the factor space was used to identify outliers within the factor space. If the upper-tail probability of the T^2 test statistic was < 0.05 , then a particular BMP site was judged to be an outlier in factor space.

BMP RETROFIT PILOT PROGRAM SITES-DISTRICT 7, LOS ANGELES

Table 1

BMP	Location	Map I.D.	Location Description
Trapping Catch Basin			
	210 West of Orcas	1	The trapping catch basin is located approximately 850 feet (259 meters) west of Orcas Avenue in the City of Lake View Terrace, and consists of four drain inlets, two on each side of the I-210 freeway. The monitoring location can be accessed from Foothill Boulevard.
	210 East of Orcas	2	The trapping catch basin site is located approximately 150 feet (46 meters) east of Orcas Avenue in the City of Lake View Terrace, and consists of a total of four drain inlets, all of which are situated along the westbound I-210 shoulder. The site can be accessed from Orcas Avenue.
	210 East of Filmore	3	The trapping catch basin site is located east of Filmore Street near the I-210/SR 118 interchange in the City of Lake View Terrace.
	210 East of Van Nuys Blvd.	4	The trapping catch basin is located just north of Carl Street, east of Foothill Boulevard, on slopes adjacent to the shoulders of both westbound and eastbound I-210 in the City of Lake View Terrace. The monitoring area can be accessed by the Pierce Street entrance to the Caltrans right-of-way south of the I-210 eastbound freeway.
Catch Basin Inserts			
	Las Flores MS	5	The Las Flores Maintenance Station is located at 2503 Las Flores Canyon Road in the City of Malibu, approximately one half mile east of Pacific Coast Highway. The site is located in a rural, sparsely populated area.
	Rosemead MS	6	The Rosemead Maintenance Station is located at 9153 Lower Azusa Road, about one mile north of the I-10 freeway, Rosemead off-ramp. The station is located in a commercial area. The BMPs will be installed in the southwest corner of the maintenance station.
	Foothill MS	7	The Foothill Maintenance Station is located at 850 East Huntington Drive, just off the I-210 freeway, Mountain Avenue off-ramp. The station is located in an industrial area with a major storm channel along the western side of the facility.

Extended Detention Basin		
I-605 (south)/SR-91 Interchange	8	The site is located between the SR 91 (eastbound)/I-605 (southbound) connector and I-605 (southbound) in the City of Cerritos. The site lies at a depth of approximately 20 feet below grade of I-605. Access to the site is from Artesia Boulevard.
I-5/I-605 (south)	9	The site is located between the I-5 and the I-605 (southbound)/I-5 (southbound) connector in the City of Downey in southeastern Los Angeles County. Maintenance access is provided by an access road off the I-5 southbound roadway.
Infiltration Basin		
I-605 (north)/SR-91 (west)	10	The infiltration basin site is located in the cloverleaf interchange from the I-605 northbound to the 91 westbound in the City of Cerritos. The site may be accessed from the I-605 northbound freeway. No major structures are located within the vicinity of the infiltration basin.
Infiltration Trench		
Altadena MS	11	The Altadena Maintenance Station is located at 212 North Windsor Avenue just off the I-210 freeway, North Windsor Avenue off-ramp. The site is located in an urban area with commercial uses on adjacent sides and the 210 freeway located to the west.
Biofiltration Swale		
Cerritos MS	12	The biofiltration swale site is located behind the southern side of the Cerritos maintenance Station, along the SR 91 westbound embankment. The site can be accessed from the maintenance station, which is located on Studebaker Road in the City of Cerritos. The precise location for the swale is from the SR 91 drainage outlet, located at the foot of the SR 91 westbound slope, to the main area outlet culvert.
I-605 (north)/SR-91	13	The site is located behind the I-605 northbound, the SR 91 westbound/I-605 southbound connector, and the I-605 northbound/SR 91 westbound connector.
I-5 (south)/I-605 (south)	14	The site is located between the I-5 southbound and I-605 northbound connector.
I-605 (north)/Carson & Del Amo	15	The site is located along the I-605 northbound freeway between the Del Amo Boulevard and Carson Street exits. Access to the area can be achieved from the I-605 northbound shoulder.
Biofiltration Strip		
Altadena MS	11	Refer to Map I.D. No. 11 Location Description, above.
I-605 (north)/SR-91	13	Refer to Map I.D. No. 13 Location Description, above.

Media Filter	East Regional MS	16	A media filter will be sited at the Eastern Regional Maintenance Station located at 1945 Workman Mill Road, just off the 60 freeway in the City of Whittier. The maintenance station has multi-crew operations and experiences heavy vehicular traffic. The BMP is located in an area that is free from traffic and storage facilities, allowing acceptable access. The site is approximately 5 acres and is located in a commercial/industrial area.
	Foothill MS	7	Refer to Map I.D. No. 7 Location Description, above.
	Termination P & R	17	The Termination Park & Ride is a large facility at the eastern terminus of I-105 at the I-105/I-605 interchange in the City of Norwalk. A small portion of the facility is located on the westside of I-605. The facility is adjacent to a Green Line Metrolink station and has a bus terminal integrated into the park & ride facility. The lot has direct access to the car pool lanes on I-105. It is located in a predominately residential area, and is bounded by residential areas to the east, south and west, and by on-ramps and off-ramps for I-105 to the north.
Oil/Water Separator	Paxton P & R	18	The Paxton Park & Ride facility is located near the I-210/SR 118 interchange in the Pacoima region of the City of Los Angeles. It is located on the southeast corner of Paxton Street and Foothill Boulevard, with access from both streets.
	Alameda MS	19	The Alameda Maintenance Station is located at 1740 East 15 th Street, just off the I-10 freeway/Alameda Street off-ramp. The site is located under an I-10 freeway bridge.
MCTT	Metro MS	20	The Metro Maintenance Station is located at 2187 Riverside Drive, about 1 mile from the Riverside Drive off-ramp of the I-5 freeway. It is located directly under State Route 2.
	Via Verde P & R	21	The Via Verde Park & Ride site is located on the north side of Via Verde Road, upslope of and adjacent to the southbound off-ramp of the I-210 freeway to Via Verde Road.
	I-105/Lakewood P&R	22	The Lakewood Park & Ride is located on the south side of the I-105 freeway near the I-605.

BMP RETROFIT PILOT PROGRAM SITES-DISTRICT 11, SAN DIEGO

Table 2

BMP	Location	Map I.D.	Location Description
Extended Detention Basin			
San Diego Trap Site 11	I-15/SR 78 Interchange	1 Carlsbad	The site is bounded by SR 78 on the north, the I-15 on the east and the I-15 north connector to the SR 78 east, on the southwest. The basin site is located at the toe of the slope.
	I-5/Manchester Avenue (east)	2 Carlsbad	Area created by the northbound cloverleaf off-ramp from I-5 at Manchester Avenue. Area is north of Manchester Avenue and east of the I-5. Access to the area can be achieved from the Manchester Avenue westbound shoulder.
	I-5/ SR 56 Interchange	1 Penasquitos	The site is located just off of the SR 56 eastbound/I-5 southbound connector. The site may be accessed via Carmel Valley Road, just off the I-5 freeway.
Infiltration Trench/Biofilter (swale/strip)			
	Carlsbad MS	3 Carlsbad	The Carlsbad Maintenance Station is located in the City of Carlsbad, one block south of Palomar Airport Road at 6050 Paseo Del Norte. The site is bounded by Paseo Del Norte to the west and commercial and industrial uses to the south, east, and north.
	I-5 (south)/Palomar Airport Road	4 Carlsbad	The site is located along the I-5 southbound shoulder, north of the southbound I-5 Palomar Airport Road off-ramp. The location for the biofiltration swale is along the area of Caltrans right-of-way parallel to the I-5 freeway shoulder. Access to the area can be achieved from the I-5 southbound shoulder.
	SR 78 (east)/Melrose Avenue Exit	5 Carlsbad	The site is located along the SR 78 eastbound shoulder, west of the Melrose Avenue off-ramp. The location for the biofiltration swale is along the area parallel to the SR 78 freeway and Melrose Avenue off-ramp.
Infiltration Basin			
	I-5/La Costa Boulevard (west)	6 Carlsbad	The site is located along the shoulder of the I-5 southbound off-ramp at La Costa Avenue, in the City of Leucadia. The site is located in a basin south of the Batiquitos Lagoon. The site is bounded by a gas station to the south, a hillside residential area to the west, Batiquitos Lagoon to the north, and southbound I-5 and the southbound I-5 off-ramp to La Costa Drive to the east. The area can be accessed from the I-5 southbound off-ramp.

Wet Basin			
	I-5/Manchester Avenue (west)	7 Carlsbad	Area created by the southbound cloverleaf on-ramp from I-5 at Manchester Avenue. Area is located north of Manchester Avenue and west of the I-5. Access to the area can be achieved from the Manchester Avenue westbound shoulder.
Media Filter			
San Diego Trap Site 12	Escondido MS	8 Carlsbad	The site is adjacent to State Route 78 in the Escondido Maintenance Station on Mission Road. The media sand filter will be located on the western edge of the property.
	La Costa P & R	9 Carlsbad	The La Costa Park and Ride is located just east of southbound I-5 and south of La Costa Avenue in the City of Carlsbad. The facility is located in a grassy area by an existing catch basin. Access to the site is through the park and ride facility.
	I-5/SR 78 Interchange P&R	10 Carlsbad	The site is located in landscaped areas of the Interstate 5/State Route 78 Park and Ride facility on Moreno Street, adjacent to Interstate 5.
	Kearny Mesa MS	2 Penasquitos	The Kearny Mesa Maintenance Station is located adjacent to the 805 freeway at 7179 Opportunity Road in the City of San Diego. The site is bounded by commercial uses to the east, Opportunity Road to the north, and the I-805 freeway to the south and west.

RESULTS

District 7: Los Angeles

Carbon dioxide-baited light traps:

Abundance

The background abundance of host-seeking mosquitoes at BMP sites in Los Angeles County was low. Fewer than 9 mosquitoes were collected per trap night at the majority (82%) of sites. Six or fewer mosquitoes were collected on most nights (Fig. 1). Relative to catches from right-of-ways and vegetated areas adjacent to freeways, host-seeking mosquitoes were comparatively rare at Caltrans Maintenance Stations. At two sites, site 7 (Foothill MS) and site 16 (East Regional MS), mosquitoes were never collected by carbon dioxide-baited light traps. Only two host-seeking mosquitoes were collected at the Las Flores MS (site 5).

Host-seeking mosquitoes at sites in Pacoima (sites 1, 2, 3, and 4 adjacent to the I-210 freeway and site 18 at the Paxton Park and Ride) were sporadically more abundant than at other sites in District 7 (Fig. 1). Between 20 and 40 host-seeking mosquitoes were collected on several nights at sites 2, 3, 4 and 18. Host-seeking mosquito catches at site 1 were consistently greater than at sites outside Pacoima. The more rural nature of the region surrounding these BMP sites, the greater diversity of land usage (e.g., an equestrian center, a nursery, close proximity of human residences with backyards supporting lush vegetation and a variety of containers which might collect and retain water) that is likely to contain standing water, and the proximity to the foothills of the San Gabriel Mountains were probably important factors contributing to the comparatively larger populations of host-seeking mosquitoes at the Pacoima sites.

Although the potential for nuisance biting by mosquitoes was greatest at the Pacoima sites, the BMP sites in District 7 can be characterized as having very low background levels of host-seeking mosquitoes. Even though the differences in the medians for abundance of host-seeking mosquitoes differed significantly among BMP sites ($\chi^2_{21} = 53.6$, $P < 0.001$), because the differences among medians for the sites were extremely small (range: 0 to 2), host-seeking mosquito abundance at any particular site was not consistently different from the other sites during the period of background monitoring.

Species Composition

Six mosquito species were collected at District 7 sites during background monitoring; although only one species was common at most of the Los Angeles sites. The species assemblage was characteristic of urban environments. *Culex quinquefasciatus* was predominant (relative abundance $\geq 83\%$) at 15 sites (68% of sites within District 7). In addition to the two sites (7 and 16) where host-seeking mosquitoes were never collected, *Cx. quinquefasciatus* was not collected at site 5 in Malibu. Even though *Cx. quinquefasciatus* was comparatively less prevalent at four sites [site 1 (55%), site 4 (79%), site 21 (57%) and site 22 (75%)], it represented more than half of the specimens

collected. Districtwide, other mosquitoes were rare: *Cx. tarsalis* (3%), *Culiseta incidens* (2%), *Cs. inornata* (6%), *Aedes increpitus* (1%), *Anopheles franciscamus* (2%) and *An. hermsi* (<1%). Proportions are calculated using the sum of individuals collected by all CO₂-baited traps; these values differ slightly from per trap averages (cf. Table 5).

The Pacoima sites exhibited the greatest mosquito diversity. *Culex tarsalis*, the predominant vector of encephalitides in California, was 3-16% of the host-seeking mosquitoes collected at the sites along the I-210 freeway. *Anopheles franciscamus* was 6-7% of the catch at sites 1 and 2. *Culiseta* spp. was 4-33% of the host-seeking mosquitoes collected at the Pacoima sites and was found primarily in sites along the northern and southern regions of District 7. *Culiseta* was present at most sites (1, 2, 4, 7, 11, 18, 21) adjacent to the San Gabriel Mountains (along the eastern border of the San Fernando Valley and the northern border of the San Gabriel Valley) and at two sites (15, 22) in Lakewood.

Gravid traps:

Abundance

Gravid mosquitoes were collected at all BMP sites (Fig. 2). At most sites, oviposition activity declined in mid-September, increased again during late September and early October, and then decreased to low levels during November. Unlike the comparatively small host-seeking populations which did not exhibit districtwide trends for abundance, activity patterns of gravid mosquitoes exhibited a synchronization, albeit inexact, that was indicative of basinwide influence of environmental factor(s).

Gravid trap catches of mosquitoes were approximately an order of magnitude larger than were those in the carbon dioxide-baited traps (intact specimens: 3494 vs. 364). At four sites, abundance of gravid females was > 100 individuals per trap night (Fig. 2). The number of gravid mosquitoes collected was at least 4% higher than the aforementioned value because predaceous ants were a problem at several sites. The ants tended to remove the wings from mosquitoes in the traps before carrying off the body. The wings were however identifiable to genus using the venation and color patterns of the wings. All wings collected were from *Culex*.

Three categories of mosquito abundance were observed in gravid trap collections (Table 3). The categories are based on an approximately 3-fold increase in the number of individuals collected per trap night (averages of 3, 9 and 30 individuals per trap night). The mean abundance of gravid mosquitoes at each BMP site was correlated strongly with the median abundance ($r = 0.89$); hence, the categories are in general agreement with both measures of central tendency. The differences in the median abundance values among the sites were greater than would be expected by chance ($\chi^2_{21} = 51.2$, $P < 0.001$); however, differences of ranks were statistically significant only for sites 11, 15, 16 versus all other sites. This result indicates that abundance of gravid mosquitoes was not concordant among most of the sites across the sampling period; that is, the order of ranks for gravid mosquito abundance at sites tended not to be consistent in repeated samples.

When the entire complement of traps was considered, mosquito abundance in gravid traps was independent of that in CO₂-baited light traps ($r = 0.08$). Incorporation of 1- or 2-week time lags in the gravid trap catches relative to the carbon dioxide-baited trap catches did not change this conclusion ($r \leq 0.04$). The two trap types sample different components of the adult mosquito population (females in search of a blood meal vs. females in search of an oviposition site) whose dynamics are not tightly coupled at these urban sites.

Table 3. Categories of mosquito abundance in gravid traps at District 7 BMP sites.

Category	Sites
I. Collections occasionally > 40 individuals/ trap night (avg./trap night: 28, 33, 24, 40)	2, 5, 17, 19
II. Collections occasionally b/w 25-40 individuals/ trap night (avg./trap night: 8.5, 14.8, 7.8, 7.5, 10.6, 6.6, 7.4)	6, 8, 9, 10, 15, 18, 20
III. Collections occasionally b/w 10-25 individuals/ trap night (avg./trap night: 2.8, 3.9, 1.8, 3, 0.5, 3, 2.7, 3.7, 0.7, 2.7, 2)	1, 3, 4, 7, 11, 12, 13, 14, 16, 21, 22

Species Composition

Culex quinquefasciatus was essentially the only mosquito collected in gravid traps (99% of individuals collected in all traps). Four other species were present in gravid trap collections: *Cx. tarsalis*, *Cs. incidens*, *Cs. inornata*, and *Ae. increpitus*.

Missing Data

The monitoring program was very successful and missing data occurred rarely. Missing data were caused by problems regarding access to sites, ongoing construction activities, human error, and theft of traps or trap components. Trap failures due to mechanical problems did not occur. Safe access to sites 1 - 4 was possible after gates were installed by the third week of activities. Traps and power supplies were stolen from site 4 in mid-September. Coordination of activities at the Malibu site caused an initial delay in sampling and human error (an incorrect determination of the status of the UV light source) resulted in no light trap collection on 23 September. Construction activities on one date at site 8 and on two instances at site 10 did not allow for safe placement of the traps. Trap power supplies were stolen from sites 15 and 17. On 1 September, heavy freeway traffic delayed arrival at site 20 until after closure of the maintenance station. Inclement weather precluded trapping in late November.

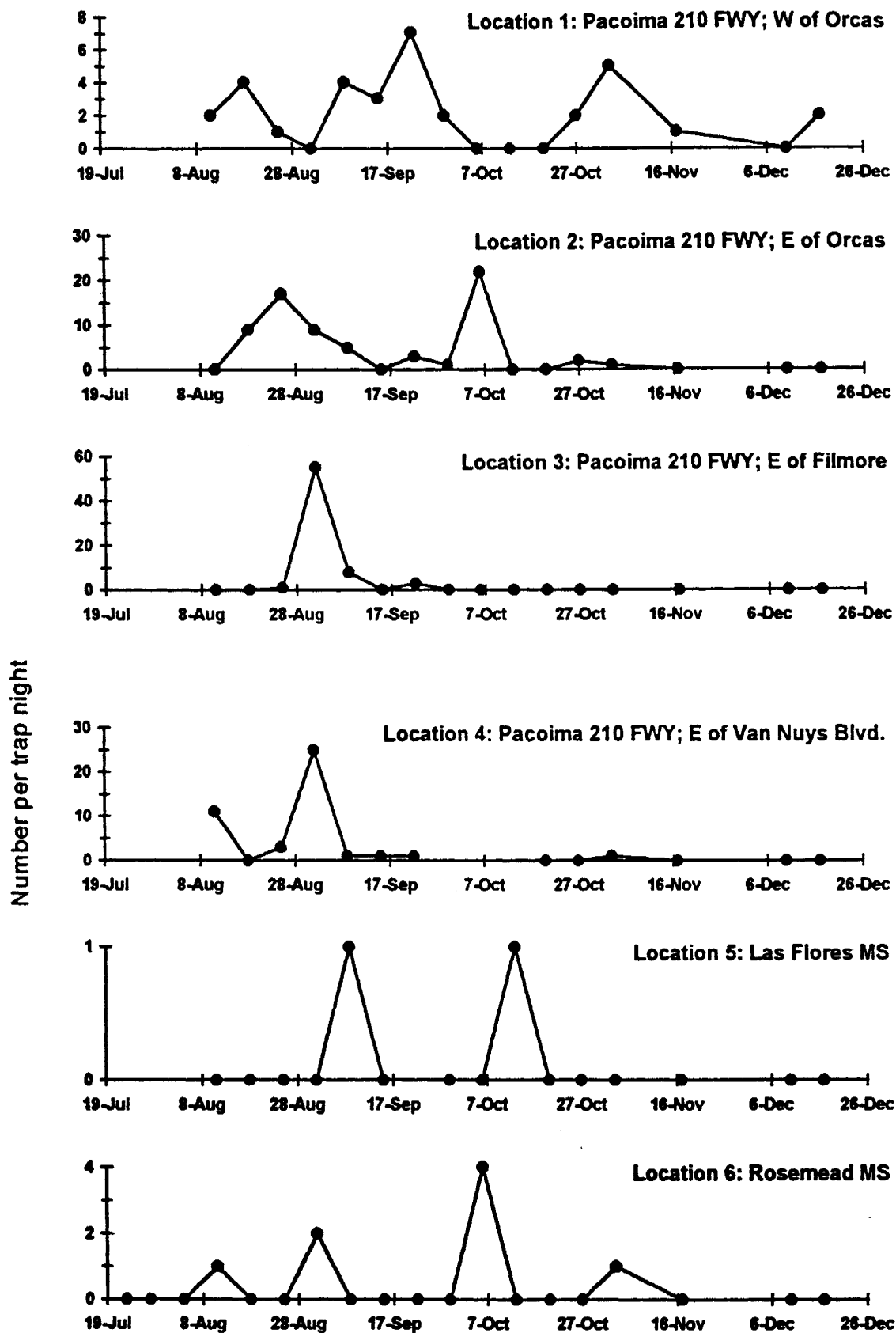


Fig. 1. Abundance of mosquitoes in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

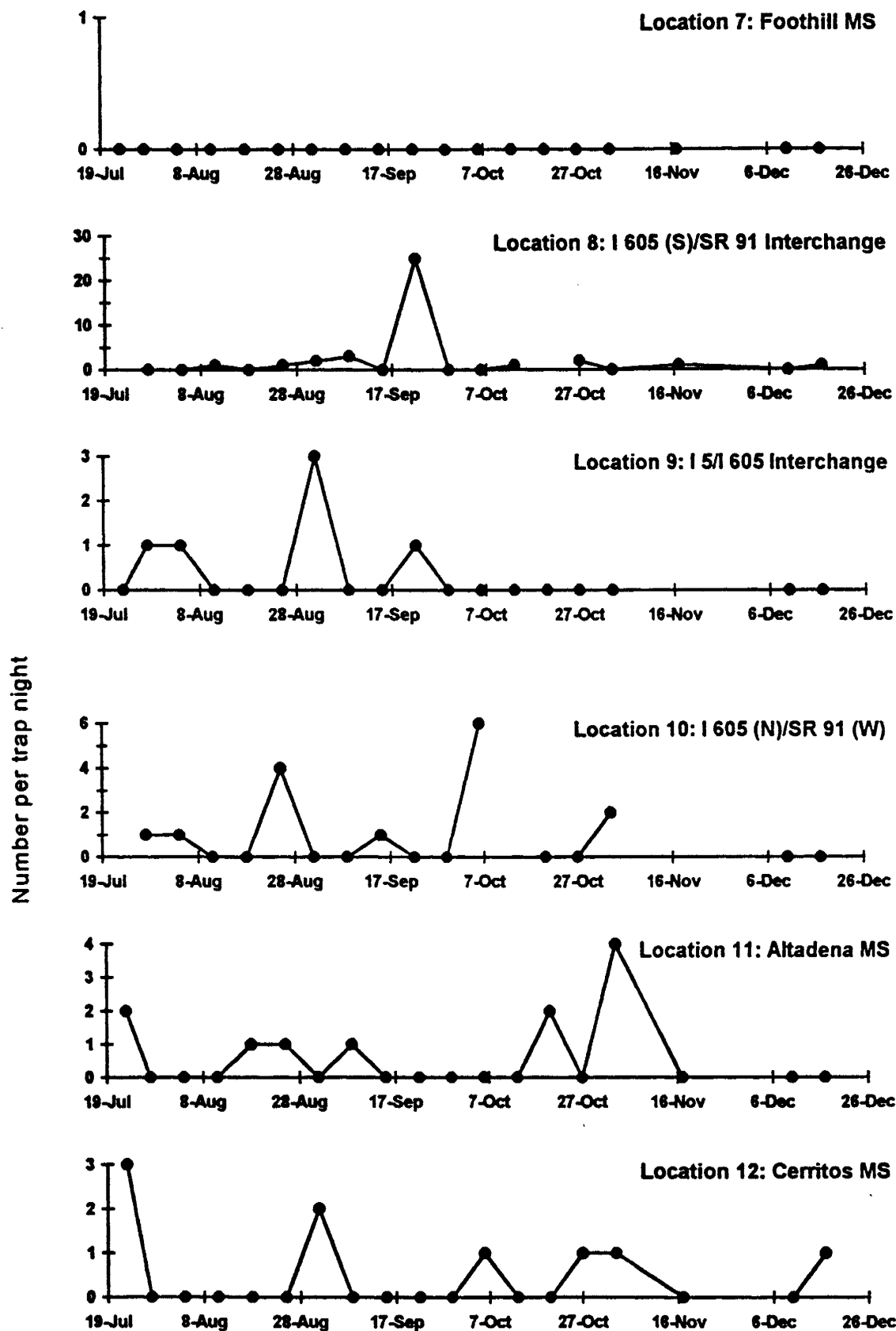


Fig. 1 (continued). Abundance of mosquitoes in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

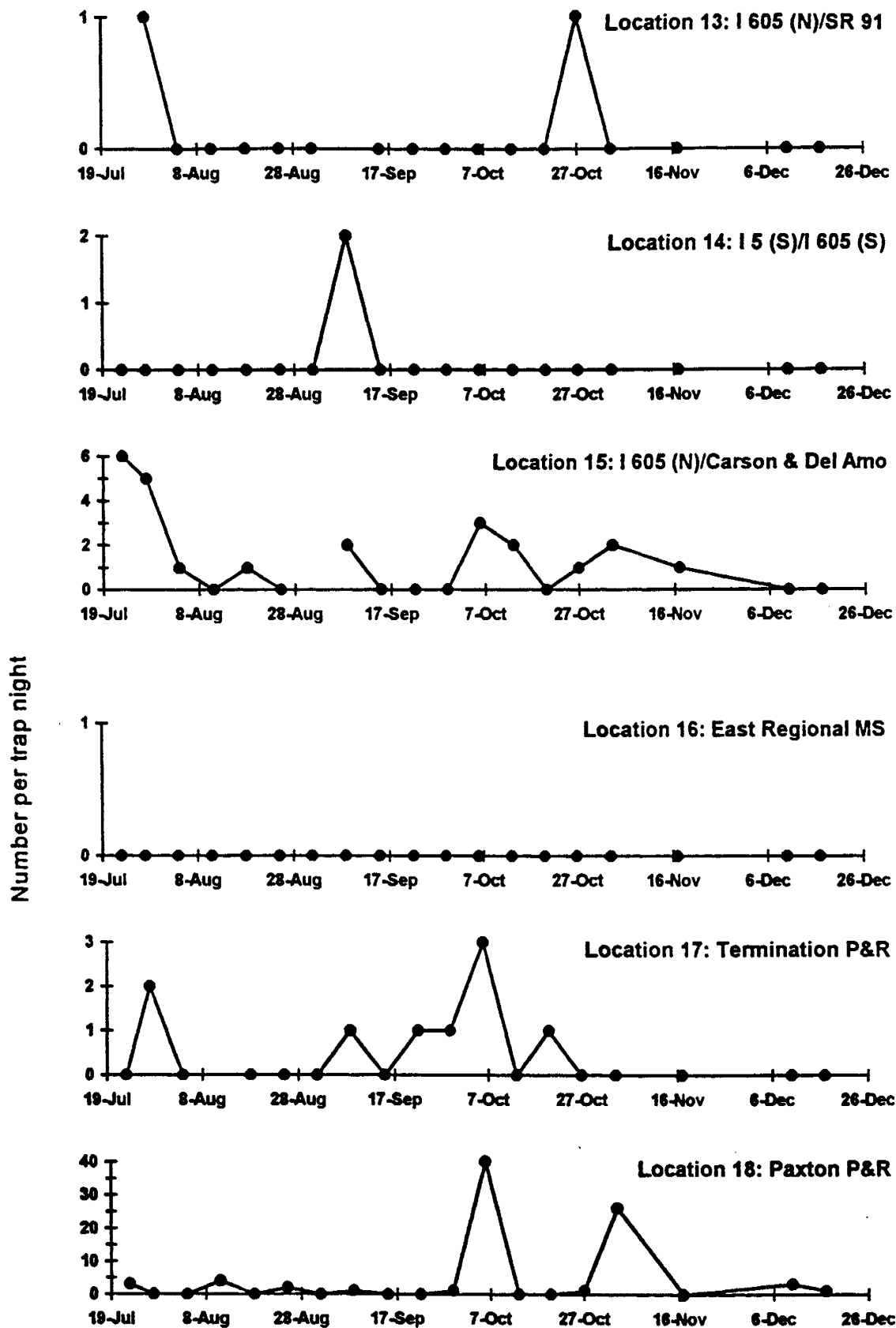


Fig. 1 (continued). Abundance of mosquitoes in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

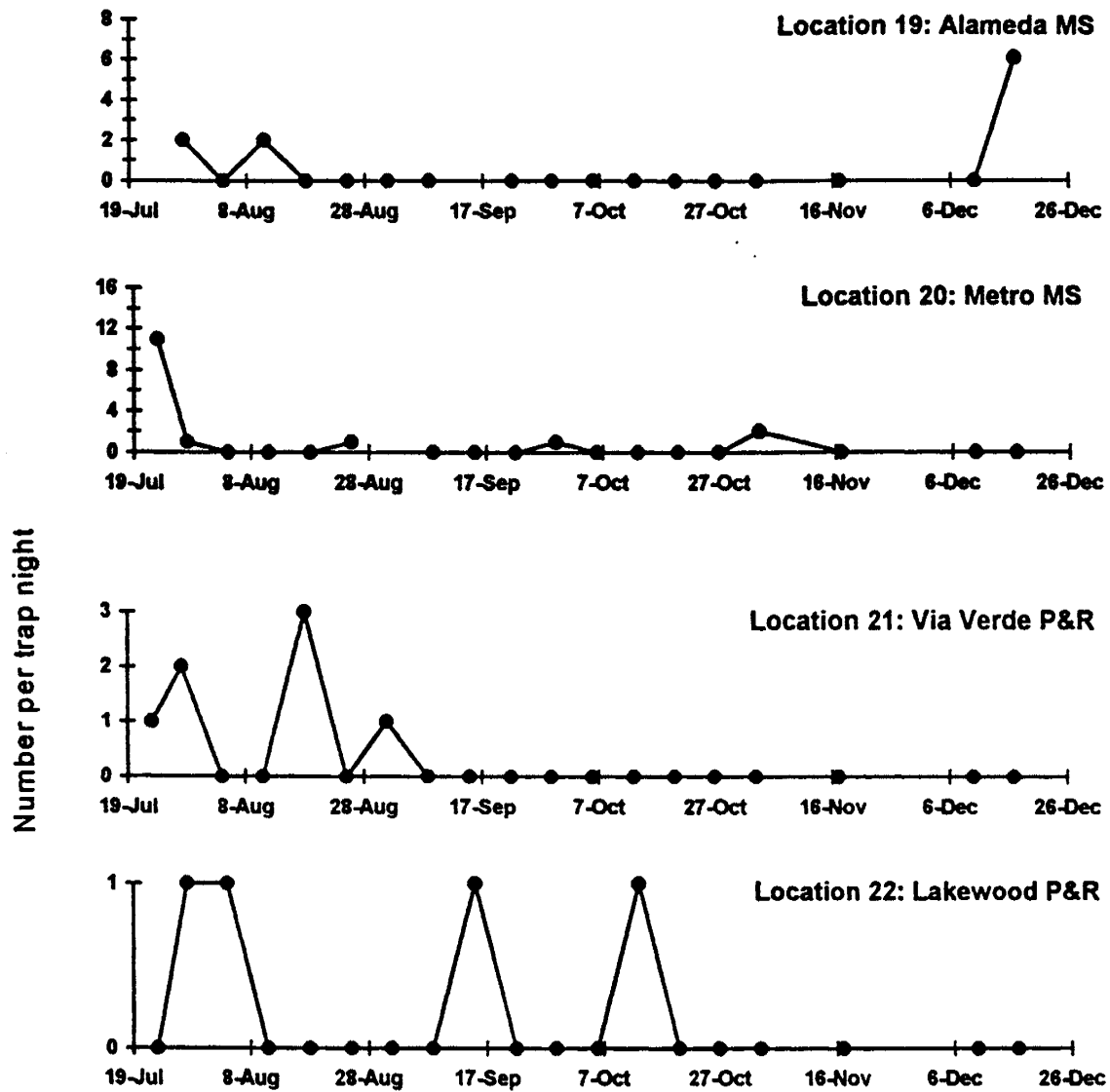


Fig. 1 (continued). Abundance of mosquitoes in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

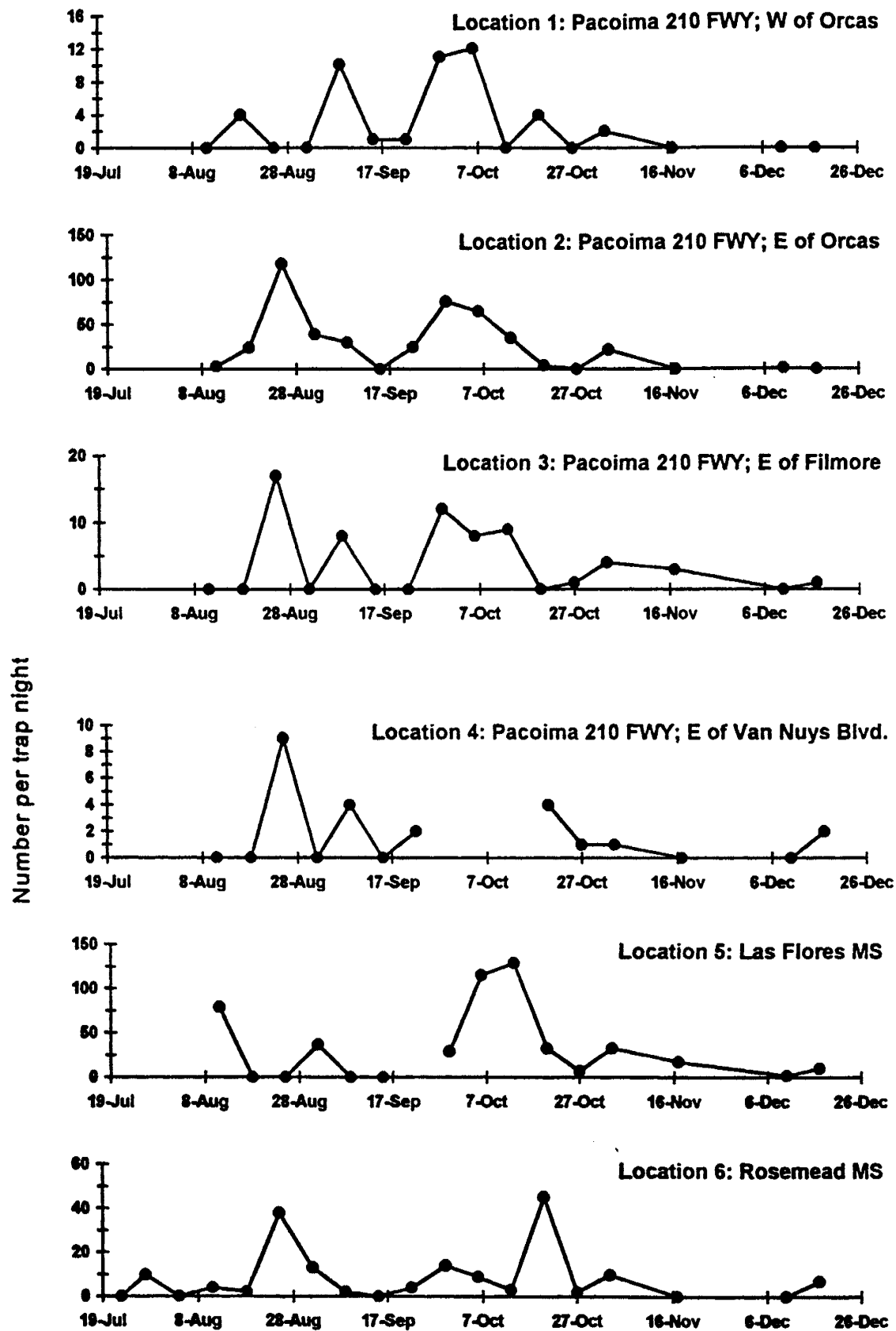


Fig. 2. Abundance of mosquitoes in gravid traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

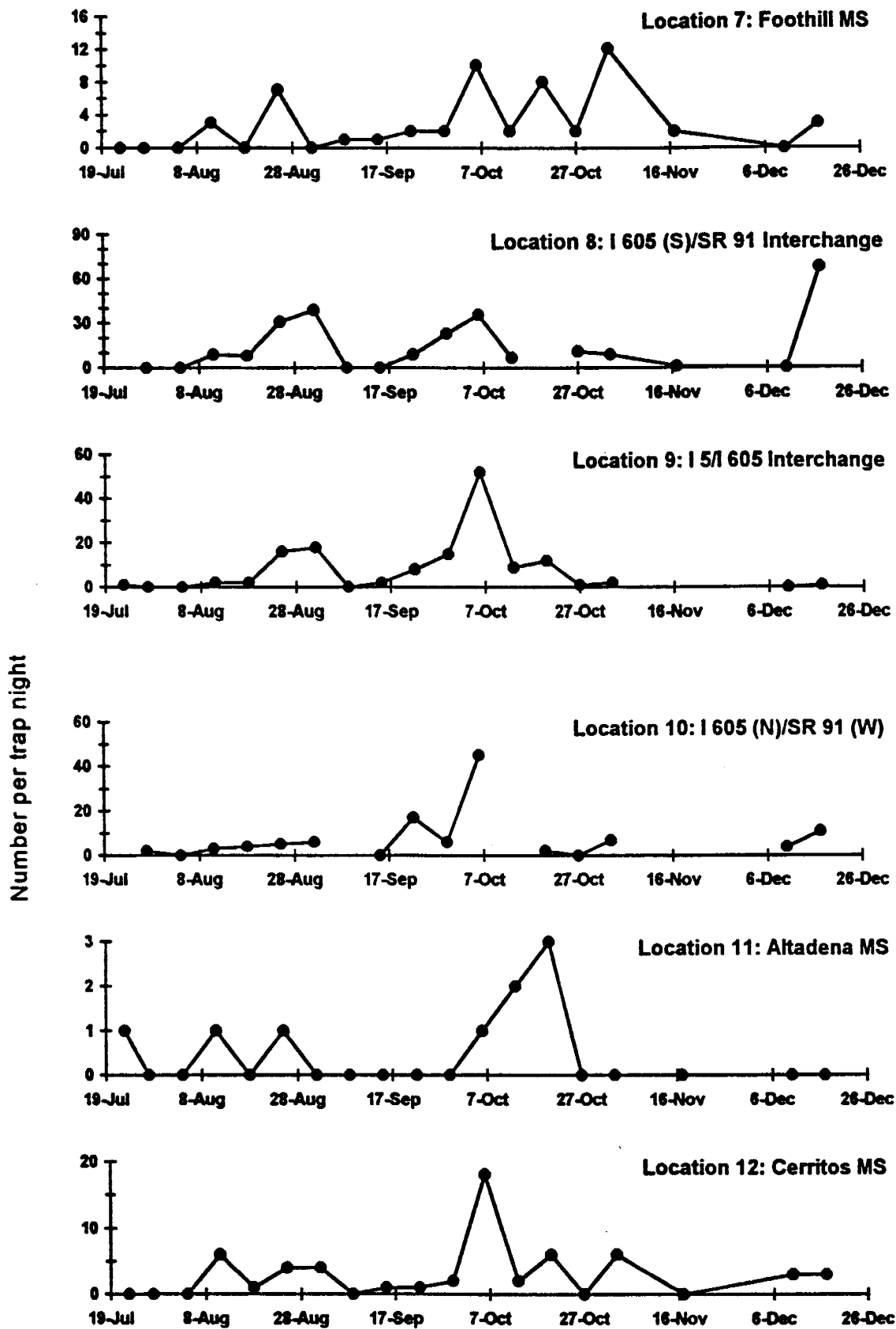


Fig. 2 (continued). Abundance of mosquitoes in gravid traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

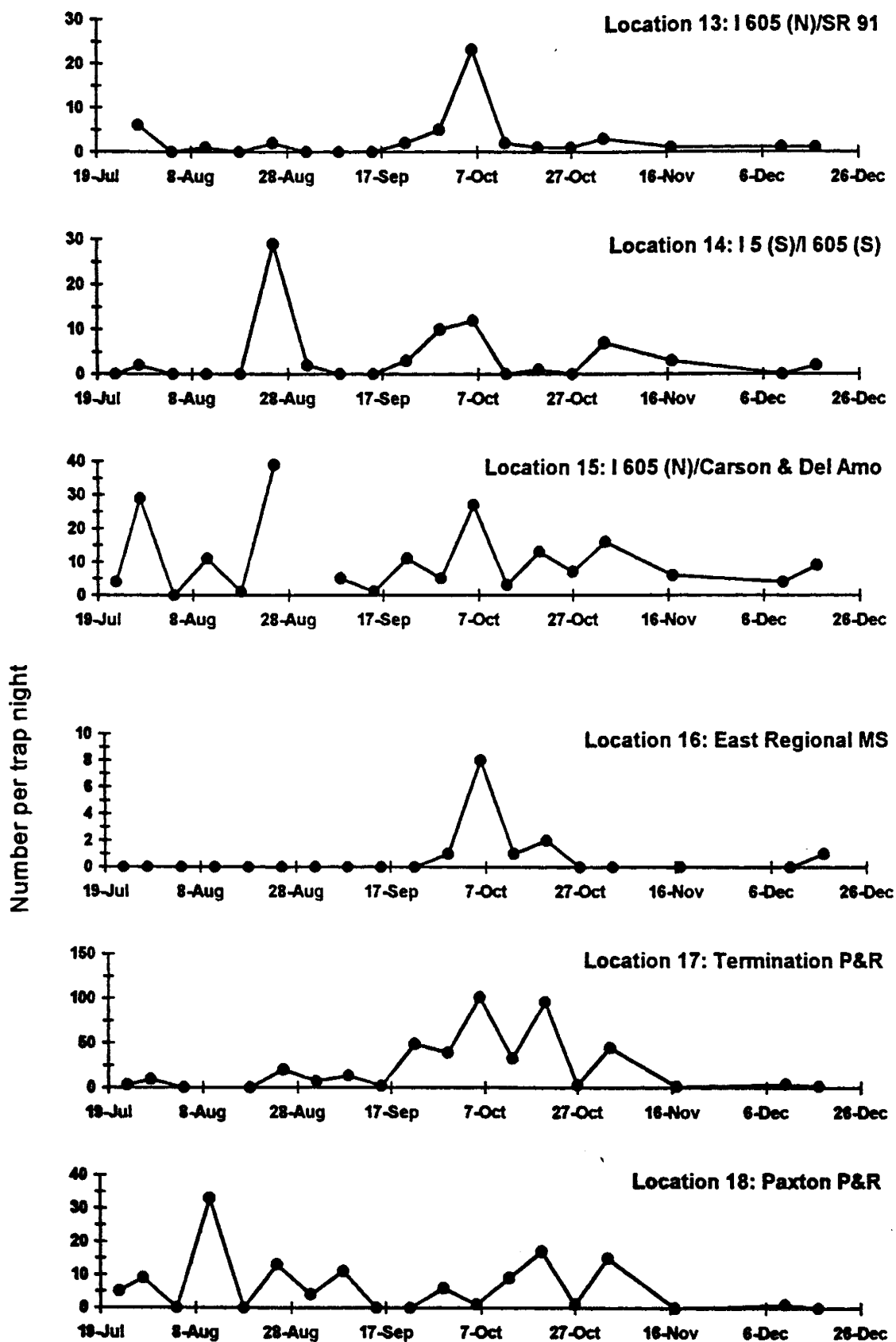


Fig. 2 (continued). Abundance of mosquitoes in gravid traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

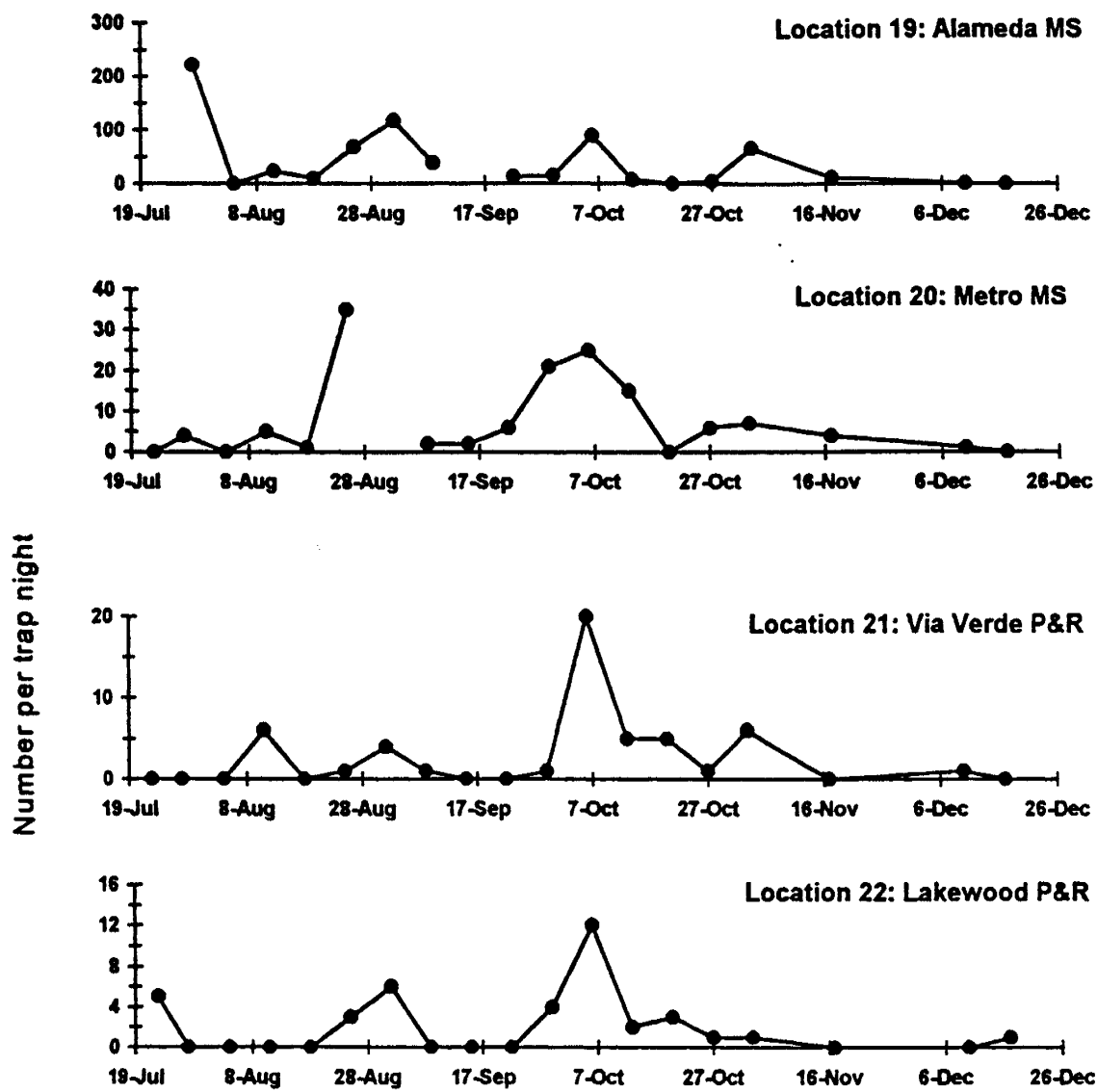


Fig. 2 (continued). Abundance of mosquitoes in gravid traps at District 7 BMP sites during the Vector Control Background Monitoring Study.

District 11: San Diego

Carbon dioxide-baited light traps:

Abundance

At ten of the twelve BMP sites, the background abundance of host-seeking mosquitoes at BMP sites in San Diego County was low. Fewer than 6 mosquitoes were collected per trap night at the majority of sites (Fig. 3). However, host-seeking mosquitoes at the I-5/SR-78 Interchange Park & Ride (site 10) and the I-5/SR 56 (West) Interchange (site 11) were markedly more abundant than at the other San Diego sites. Host-seeking mosquito abundance at sites 10 and 11 varied between 6 and 24, and between 3 and 79, individuals per trap night, respectively, from the end of July until mid-September. Host-seeking mosquito abundance at site 10 declined abruptly during the third week of September and then increased throughout October, averaging about 10 individuals per trap night. In contrast to the trend at site 10, the number of host-seeking female mosquitoes collected per trap night at site 11 declined during the third week of September and remained at low levels (< 5 individuals per trap night) throughout the remainder of the study.

The differences in the median abundance values among the sites were greater than would be expected by chance ($\chi^2_{11} = 61.6$, $P < 0.001$). The trends for host-seeking female activity at sites 10 and 11 differed significantly from each other and from the other sites.

Species Composition

Nine mosquito species were collected during the period from July 30 through December 19, 1998. The species assemblage in District 11 was more diverse than that found in District 7 and reflects the diversity of habitats adjacent to the BMP sites in San Diego. Based on the total number of individuals collected districtwide, three species were collected in nearly equivalent relative abundance among all individuals collected by CO₂-baited light traps: *Culex erythrothorax* (32%), *Cx. tarsalis* (25%) and *Cx. quinquefasciatus* (26%). *Culex quinquefasciatus* was collected at all sites except site 10 in the northwest of the BMP sites in District 11. *Culex tarsalis* was captured at nine sites and ranged in relative abundance from 5% at site 10 to 58% at site 11. This species was prevalent at the four southernmost BMP sites (2, 7, 11, and 12). *Culex erythrothorax* was collected from six sites. Ninety-one and twenty-nine (29) percent of the host-seeking individuals at site 10 and site 5, respectively, were *Cx. erythrothorax*. This species was also found at three southern sites (2, 7, and 11) and at the Carlsbad MS (site 3). As compared to *Cx. tarsalis* and *Cx. quinquefasciatus* which are capable of moving from larval developmental sites at a rate > 1 km per night (Schreiber et al. 1989, Reisen et al. 1992), *Cx. erythrothorax* host-seeking populations exhibit greater natal site fidelity and tend not to migrate farther than 2 km from larval developmental sites (Walton et al. 1999). Developmental sites for the tule mosquito, *Cx. erythrothorax*, are usually thickly vegetated marshes or sumps (Bohart and Washino 1978, Walton et al. 1999). Such sites must be in proximity to the BMP sites where this species was routinely collected by carbon dioxide-baited light traps. This species feeds predominantly on mammals and can be pestiferous for humans (Chapman 1962, Walton et al. 1999). However, *Cx. erythrothorax* is not a significant public health concern, unlike *Cx. tarsalis* and *Cx. quinquefasciatus* which are efficient vectors of pathogens to humans and livestock (Meyer et al. 1988).

Other species collected as host-seeking adults included *Culiseta incidens* (1%), *Cs. inornata* (3%), *Aedes squamiger* (1%), *Ae. nigromaculis* (1%), *Ae. increpitus* (8%), and *Anopheles hermsi* (7%). *Culiseta* was not collected at inland sites near Escondido and was a greater proportion of host-seeking populations at the northwest (site 10) and southern (sites 11 and 12) sites. The three *Aedes* were collected at southern sites (sites 2, 7 and 11). The primary vector of human malaria in San Diego County, *An. hermsi*, was collected at sites 10 and 11.

Gravid traps:

Abundance:

Gravid trap catches of mosquitoes were more than 3 times larger than those in the carbon dioxide-baited traps (intact specimens: 1632 vs. 504). Gravid mosquitoes were collected at all BMP sites (Fig. 4). At most sites, oviposition activity occurred during August and then declined in mid-September. Catches in gravid traps increased again during late September and early October, and then decreased to low levels during November. Like the relationship between the two trap types in District 7, the comparatively small host-seeking populations at the San Diego BMP sites did not exhibit districtwide trends for abundance; whereas, activity patterns of gravid mosquitoes exhibited an approximate synchronization that was indicative of banished influence of environmental factor(s). A peak in ovipositional activity during the first week of October was evident in both District 7 and 11. Further, roughly similar trends for gravid mosquitoes at sites 3, 4, 6 and 9 suggested that local geographical/environmental factors within District 11 influenced oviposition behavior of mosquitoes.

Host-seeking and gravid female mosquito activity was independent at the San Diego sites. When the entire complement of traps was considered, mosquito abundance in gravid trap collections was independent of that in CO₂-baited light traps ($r < 0.13$). Incorporation of 1- or 2-week time lags did not change this conclusion ($r \leq 0.09$). Even though host-seeking activity was low, the potential for colonization of standing water by gravid mosquitoes exists at all sites.

The number of gravid mosquitoes collected was at least 7% higher than the 1632 individuals reported above because predaceous ants were a problem at several sites. All wings collected were from *Culex*.

If three categories of mosquito abundance are used as was done for collections from District 7, one half the District 11 sites had activity levels that fluctuated between no activity and 10-25 gravid females per trap night (Table 4). The mean abundance of gravid mosquitoes at each San Diego BMP site was less strongly correlated with the median abundance ($r = 0.67$) than at the Los Angeles sites. The medians for sites 5 and 7 were appreciably lower than the means; the correlation increased significantly ($r = 0.93$) when these sites were removed from the comparison. Medians ranged from 0.5 to 8.5. The differences in the median abundance values among the sites were greater than would be expected by chance ($\chi^2_{11} = 27.4$, $P < 0.004$). The trend for gravid female activity at site 5 differed significantly from the other sites.

Table 4. Categories of mosquito abundance in gravid traps at District 11 BMP sites.

Category	Sites
I. Collections occasionally > 40 individuals/ trap night (avg./trap night: 21, 16.3)	5, 7
II. Collections occasionally b/w 25-40 individuals/ trap night (avg./trap night: 11.1, 10.6, 7, 9.2, 10)	2, 3, 9, 10, 11
III. Collections occasionally b/w 10-25 individuals/ trap night (avg./trap night: 3.1, 5.4, 5.5, 5.3, 6.7)	1, 4, 6, 8, 12

Species Composition

Culex quinquefasciatus was collected in the greatest numbers by gravid traps, 92% of the individuals collected. Two other *Culex* were 7% of the total catch (*Cx. erythrothorax* = 5%), *Cx. tarsalis* = 2%). The remaining 1% was comprised of five species (*Cs. incidens*, *Ae. squamiger*, *Ae. nigromaculis*, *Ae. increpitus*, and *An. hermsi*).

The distribution of the species was similar to that found in the carbon dioxide-baited traps. *Culex quinquefasciatus* was collected throughout District 11 and, relative to sites where this species was > 90% of the specimens collected, its abundance was not markedly lower at sites where the two other *Culex* were present: sites 6 and 9 near Batiquitos Lagoon, site 10, and the two southernmost sites in Carmel Valley (site 11) and Kearny Mesa (site 12).

Culiseta was rare at the coastal sites in San Diego. *Aedes* and *Anopheles* were concentrated at the southernmost sites (9, 11 and 12).

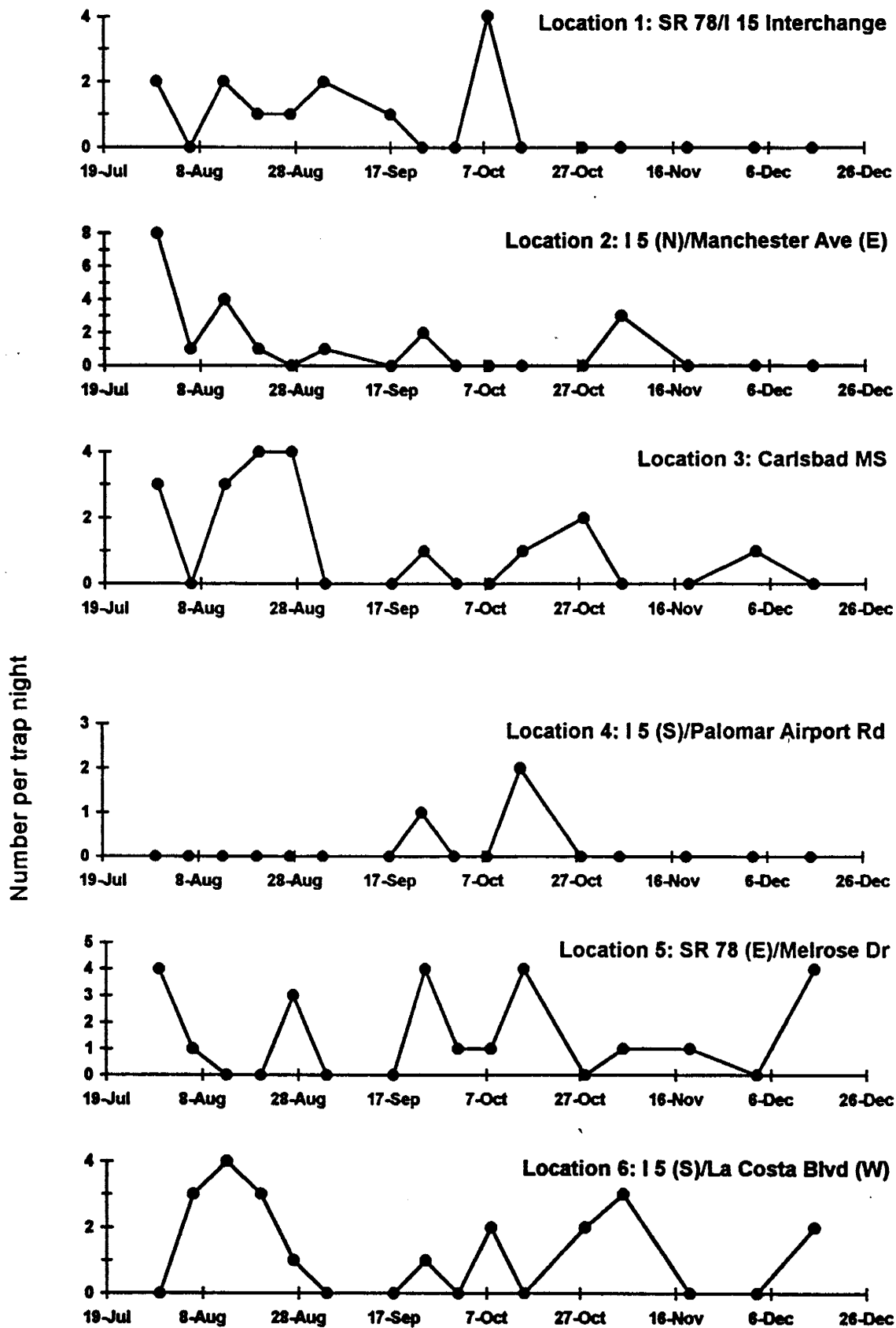


Fig. 3. Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps at District 11 BMP sites during the Vector Control Background Monitoring Study.

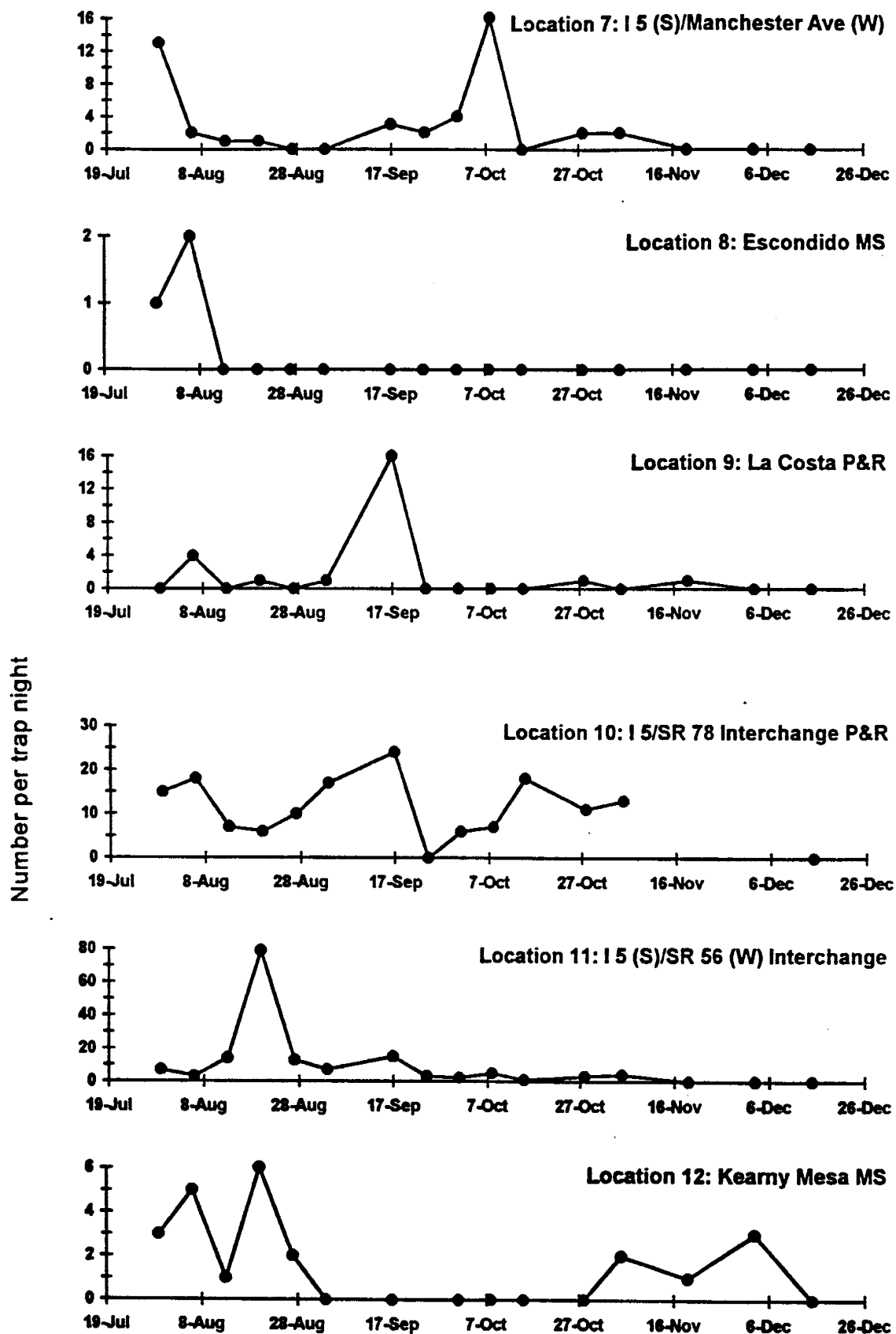


Fig. 3 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps at District 11 BMP sites during the Vector Control Background Monitoring Study.

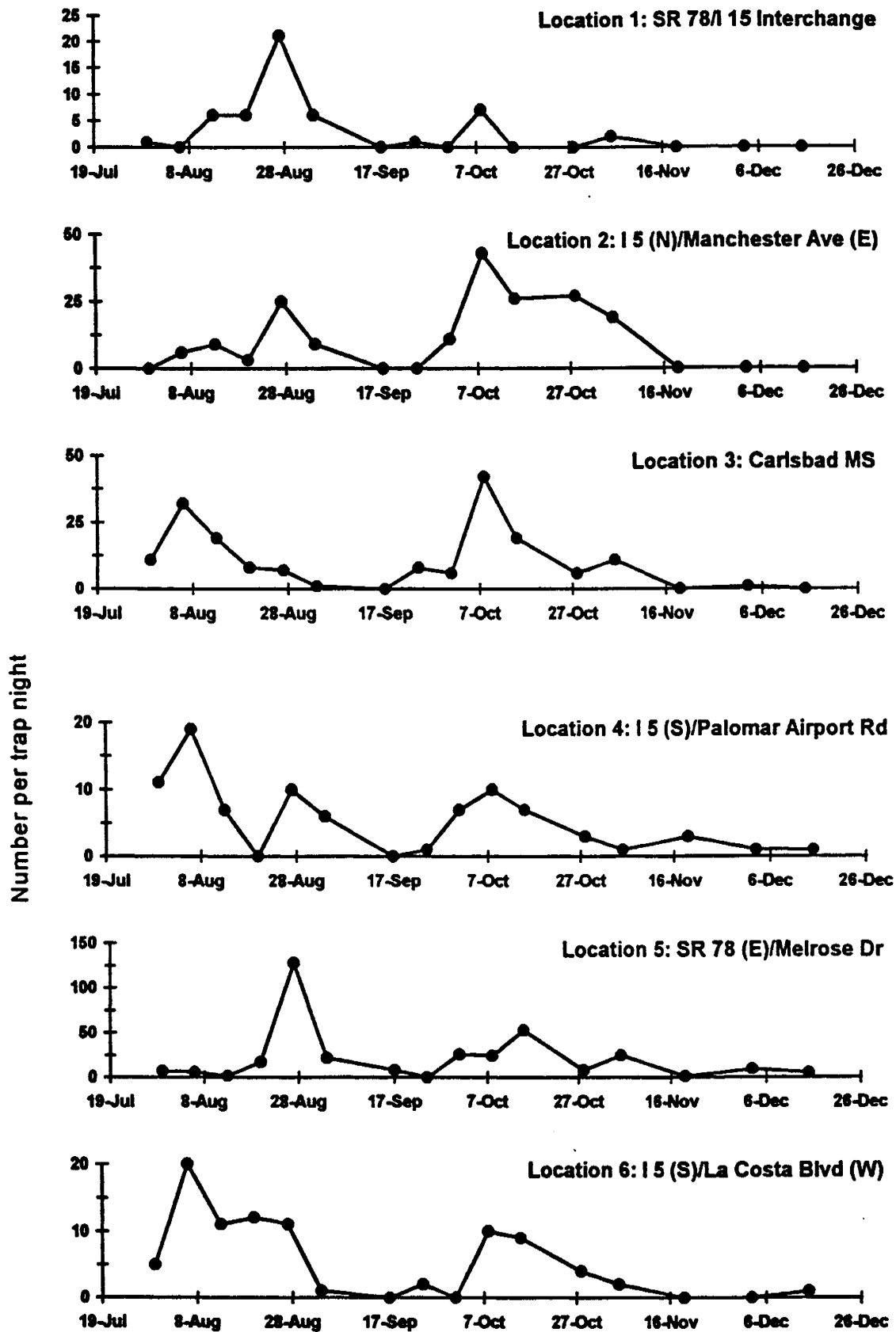


Fig. 4. Abundance of mosquitoes in gravid traps at District 11 BMP sites during the Vector Control Background Monitoring Study.

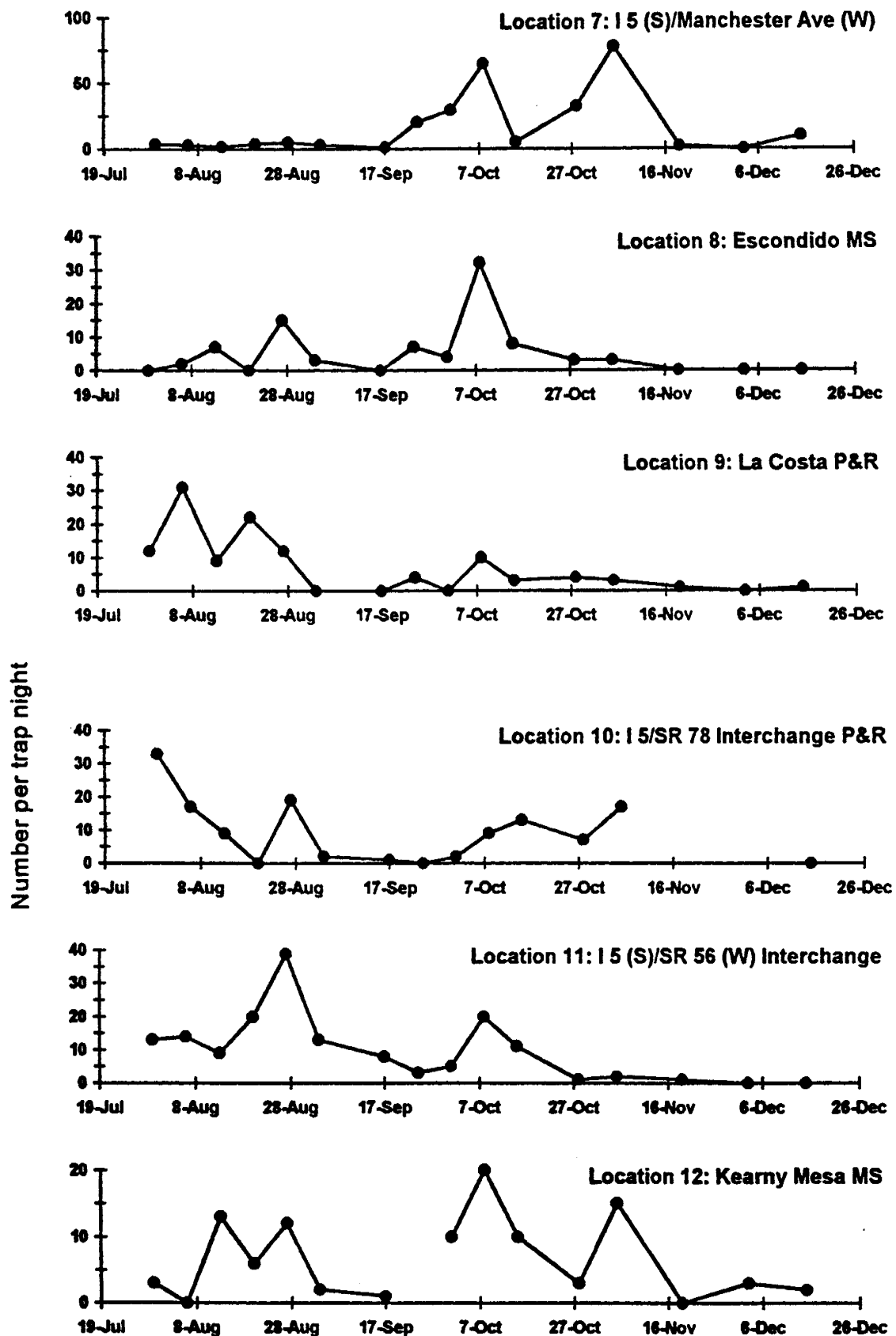


Fig. 4 (continued). Abundance of mosquitoes in gravid traps at District 11 BMP sites during the Vector Control Background Monitoring Study.

Missing Data

Missing data were caused by ongoing construction activities and human error.

Construction at site 10 did not allow for safe placement of the traps on three dates. A case of human error resulted in a problem with the power supply for trap 12 on one date. Trap failures due to mechanical problems did not occur.

Relationships between Mosquito Abundance and Weather Conditions

The differences in daily average temperature among sites were greatest during July and August (Figs. 5A and B). Among site variation in daily average temperature decreased in September and remained comparatively small throughout the autumn. During summer, sites closer to the Pacific Ocean were cooler and exhibited approximately 6-9°C less variation in daily temperatures. On average, the difference for daily maximum and daily minimum temperature between coastal and inland sites was between 3-6°C for the monitoring period (Table 5).

Precipitation events measured at the CIMIS stations were ≥ 2 mm in early September, early October, early and mid-November, and early and mid-December (Fig. 5C). Smaller rain events occurred in mid July, early August and early November. Trace amounts of precipitation were routinely recorded at the Oceanside site during the summer and might have been caused by condensation of fog or dew on the sensor/gauge.

The large-scale effects of abiotic factors, such as temperature and precipitation, on mosquito populations were evident in the trends for gravid mosquito collections from late August through the end the study. The combined effects of decreased temperature differentiation among sites beginning in late August (Figs. 5A and B) and larger precipitation events during the late summer and throughout the autumn (Fig. 5C) probably contributed significantly to a synchronization of trends in gravid female abundance in both the Los Angeles Basin and San Diego County (Fig. 6B). The abundance of mosquitoes in gravid collections was comparatively greater than for carbon dioxide-baited light trap collections; variation in gravid trap samples at individual BMP sites had a much smaller effect on the districtwide average than did variation in the host-seeking adult collections.

The trends for host-seeking female abundance differed for sites in the two Caltrans districts and, because host-seeking populations were extremely small at the majority of BMP sites, districtwide population trends were greatly influenced by increases in the number of host-seeking mosquitoes collected at a few sites. For example, the abundance of host-seeking mosquitoes in District 7 fluctuated at approximately four week intervals (Fig. 6A). However, because the abundance of host-seeking mosquitoes collected at most District 7 sites was, on average, very low (< 6 females per trap night), the Pacoima sites primarily influenced the population trends. Given (i) the relationship between water temperature and developmental rates of immature *Culex* (Bailey and Gieke 1968, Mead and Conner 1987) and (ii) a several day time lag between adult emergence and initiation of host-seeking, the most parsimonious explanation for the periodic fluctuation of host-seeking abundance in carbon dioxide-baited suction traps at the Pacoima sites is a lag

between 14 and 21 days exists between precipitation events ≥ 2 mm and an increase in host-seeking mosquito populations during the late summer and early autumn. Because adult trapping was carried out weekly, the time lag between significant rainfall and an increase of host-seeking activity might be several days < 2 weeks.

When average daily temperatures were $\leq 15^{\circ}\text{C}$, host-seeking and gravid mosquito populations were sustained at low levels. Brief warm periods, such as those observed in mid-December, caused a small increase in adult mosquito activity. The potential for mosquito production from standing water during December is however comparatively low because water temperatures do not remain favorable for rapid mosquito development for extended periods (e.g., several days) and nighttime temperatures are typically below the minimum required for adult activity ($10\text{-}15^{\circ}\text{C}$), particularly for *Culex*. Minimum nightly temperatures also can be near or below freezing (0°C).

Table 5. Daily temperature variation (maximum air temperature - minimum air temperature) at CIMIS sites in southern California for July 1 through December 31, 1998.

<u>Site</u>	<u>Average temperature variation ($^{\circ}\text{C} \pm \text{SD}$)</u>
Claremont	14.09 ± 3.75
Glendale	13.01 ± 3.27
Long Beach	12.04 ± 4.58
Pomona	15.95 ± 4.47
Santa Monica	9.53 ± 3.22
Oceanside	12.36 ± 5.26
San Diego	9.71 ± 3.85
Temecula	13.51 ± 3.74

Except for sporadic increases in host-seeking mosquito abundance at sites 10 and 11, host-seeking populations at most District 11 sites declined from July through December (Fig. 6A). Even though host-seeking female abundance also was low at the San Diego BMP sites, the movement of host-seeking mosquitoes from natural wetlands in proximity to the San Diego BMP sites is suggested by both the trends for host-seeking female abundance and the species composition of suction trap collections. A midsummer decline in host-seeking activity is typical for large wetlands in southern California where host-seeking populations of *Culex* spp. increase appreciably during April, reach a maximum in late June through mid-July and then decline during the hottest period in summer (Walton et al. 1998, Keiper et al. 1999). Large precipitation events occurring after middle November did not cause increases in host-seeking populations.

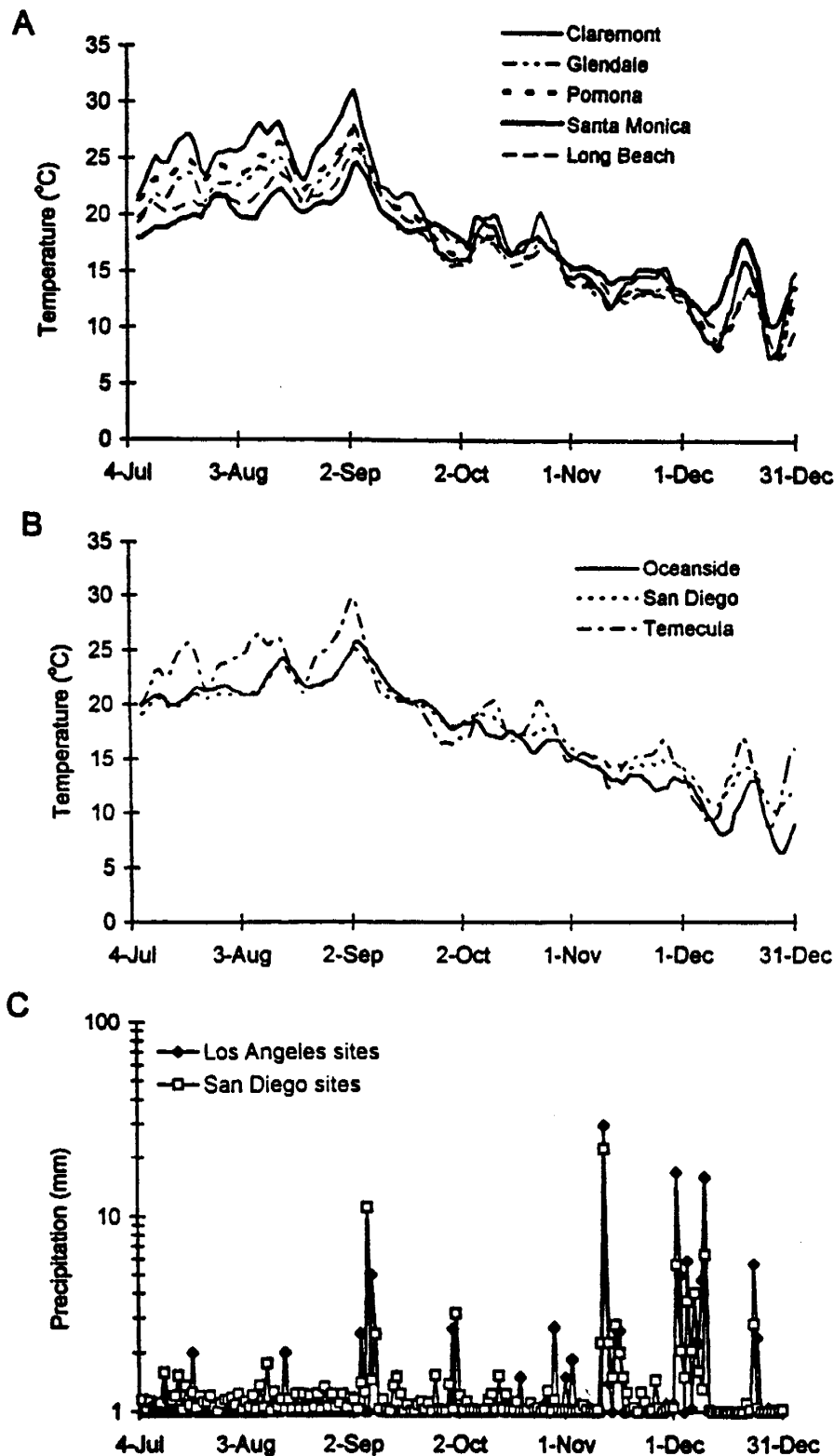


Fig 5. Average daily temperature and precipitation during the Vector Control Background Monitoring Study. (A) Seven day moving averages for daily average temperature from July 1 through December 31, 1998 at five sites in Los Angeles County. (B) Seven day moving averages for daily average temperature from July 1 through December 31, 1998 at two sites in San Diego County and one site in Riverside County (Temecula). Temecula was the closest inland CIMIS site to Escondido. (C) Composite rainfall amount (+ 1 mm) for CIMIS sites in Los Angeles and San Diego counties.

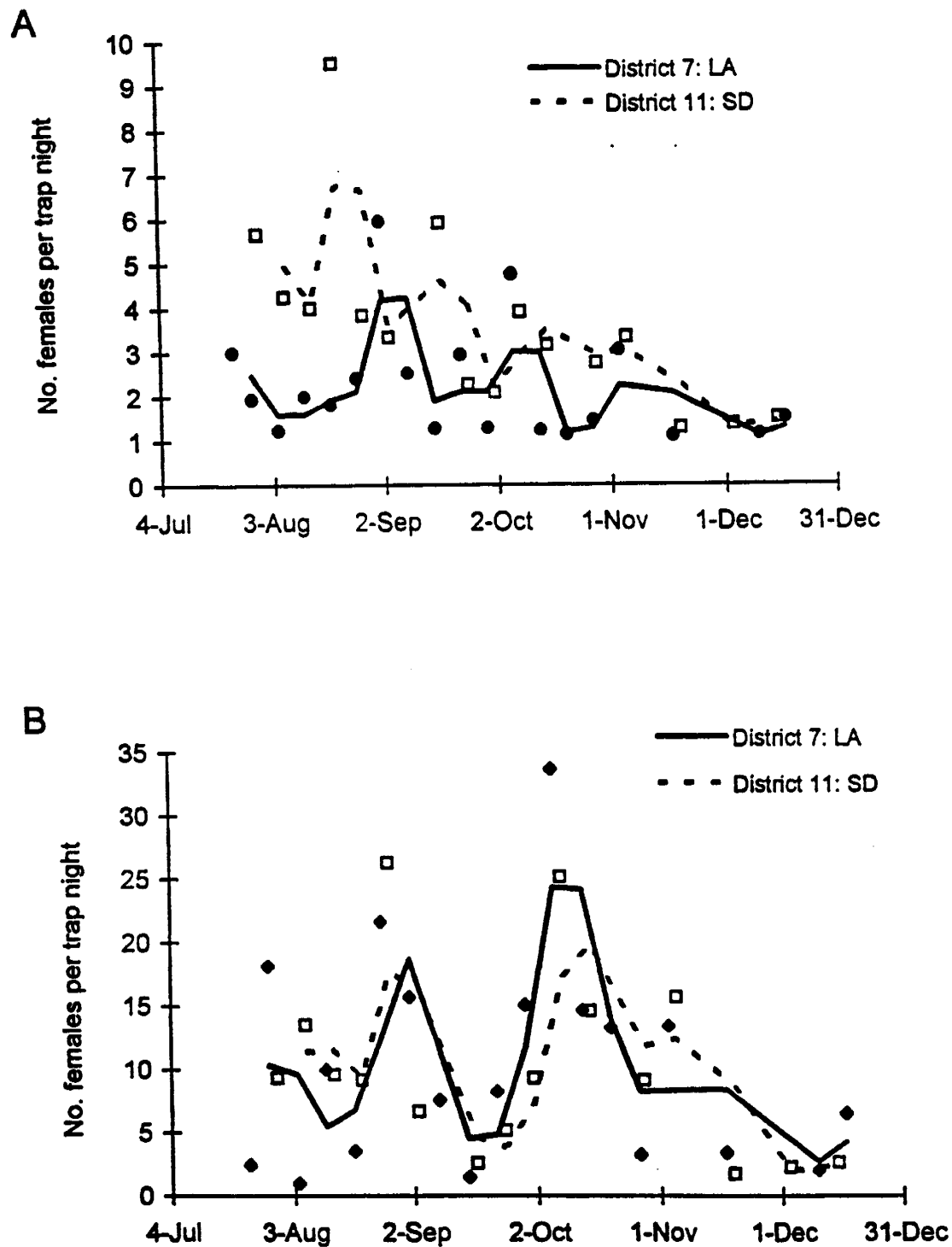


Fig 6. Districtwide abundance of host seeking (A) and gravid (B) female mosquitoes for Caltrans District 7 (Los Angeles ♦) and District 11 (San Diego □) during the Vector Control Background Monitoring Study. Two point running averages are illustrated.

Multivariate Comparisons of Mosquito Communities at BMP Sites

The host-seeking and gravid collections indicate that the background mosquito communities are best categorized as "urban". *Culex quinquefasciatus* was the most prevalent mosquito at the majority of sites in both Caltrans districts (Table 6). The differences between the mosquito communities in the two districts were that, overall, the San Diego sites had a greater species diversity, *Cx. tarsalis* and *Cx. erythrothorax* were more abundant at the San Diego sites than at the Los Angeles sites, and several *Aedes* and *Anopheles* species that were comparatively rare in Los Angeles (3% of the total individuals collected in CO₂-light traps) were more prevalent in San Diego (approximately 13% of the total catch). Further, there were intradistrict differences among the BMP sites that might have important consequences for vector production such as (1) a greater potential for the production of species that are of public health significance and (2) the presence of a more diverse mosquito community that is capable of utilizing a wider variety of ecological niches in developmental sites. The northern and westernmost sites in District 7, particularly the Pacoima sites and the Malibu site, and the southernmost sites and site 10 in District 11, had significantly different mosquito composition than did the other sites in each district.

Factor analysis of the mosquitoes collected by each trap type using principal components provided insights into the inter- and intradistrict differences among the BMP sites. Five factors were necessary to group the mosquito species found in carbon dioxide-baited light traps. The five factors explained 81.5% of the variation in the species composition; three of the principal components axes are depicted in Figure 7. The first factor separated sites which were dominated by *Cx. quinquefasciatus* from sites that included *Cx. tarsalis*, *Ae. nigromaculus* and *Ae. squamiger*. This principal component splits highly urbanized sites in Los Angeles County from the more diverse sites found in southern San Diego County (Fig. 8). It accounted for 32% of the variation in carbon dioxide-baited light catches among sites.

The second principal component axis separated sites dominated by *Cx. quinquefasciatus* from sites containing *Ae. increpitus* and *An. hermsi*. This factor separates the urban Los Angeles sites from the Malibu site and from the La Costa P & R site in San Diego. The third component separated sites containing a comparatively large proportion of *Cs. inornata* and *An. franciscanus* from all other sites; this factor separates some of the Pacoima sites from the centroid dominated by other District 7 sites. The urban LA sites are concentrated in the upper left of the plot of principal component 3 vs. principal component 1; whereas, many of the San Diego and Pacoima sites lie away from the upper left corner of the plot (Fig. 9). The fourth and fifth axes separated sites containing *Cx. erythrothorax* and *Cs. incidens*, respectively, from the other sites.

Clearly, the species composition in the CO₂-baited light traps was dominated by *Cx. quinquefasciatus* and interpretation of the ordinations requires some caution because rare species or small sample sizes can potentially have a great influence on the results. For example, only two host-seeking mosquitoes were collected at the Las Flores MS (site 5) and neither individual was *Cx. quinquefasciatus*. This site differed significantly from the

other sites. The position in ordination space of site 1 in District 7 also differed significantly (T^2 , $P < 0.001$) from the other sites and site 2 was marginally significantly different (T^2 , $0.1 < P < 0.05$). For District 11, mosquito communities at sites 10 and 11 differed significantly from all other sites. The large number of mosquitoes collected at the latter sites strengthen the conclusion that mosquito species composition differed significantly from the other BMP sites. After removing the outliers and repeating the analysis, several San Diego sites (2, 7, 8 and 12) and Los Angeles site 21 separated as a group from the other BMP sites (Fig. 10). Los Angeles sites 2 and 11 also were different from most of the District 7 sites. District 7 sites 7 and 16 were also different from the others because host-seeking mosquitoes were not collected.

Factor analysis using gravid trap catches gave very similar results to that using carbon dioxide-baited light traps. Three principal components explained 86% of the variation in species composition (Fig. 11). The first factor explained 36% of the variation in species composition and split sites containing nearly all *Cx. quinquefasciatus* from sites containing *Cx. tarsalis* and *Aedes* spp. in comparatively larger relative abundance. The second principal component separated *Cx. quinquefasciatus* sites from *Cx. erythrothorax*, *Ae. squamiger* and *Cs. incidens* sites. This factor primarily split San Diego sites 9 and 10 from site 11. The third principal component separated *Cs. inornata* from everything else. This factor split three of the Pacoima sites, site 7 in Arcadia and the Lakewood sites from the others. Gravid traps collected more mosquitoes than did carbon dioxide-baited light traps; however, fewer species were found in the gravid trap collections (Table 6). Gravid traps containing the Reiter medium are highly attractive to *Cx. quinquefasciatus* (Reisen 1995).

The positions of three sites in ordination space (LA site 4; SD sites 9 and 11; Fig. 12) were highly significantly different from the others (T^2 , $P < 0.001$). After removing the three outlier sites and repeating the analysis, sites 1, 7 and 22 in Los Angeles and sites 1 and 10 in San Diego were significantly different from the remaining sites. Mosquito species composition in gravid trap collections at most northern sites along the foothills of the San Gabriel Mountains and southern sites in Lakewood differed from other sites in District 7. Sites 1 and 11 had proportionately more *Cx. tarsalis* and *Aedes* spp. and sites 9 and 10 had proportionately more *Cx. erythrothorax* than did the other San Diego sites.

Table 6. Relative abundance (proportion \pm SE) of mosquitoes collected by two trap types at District 7 and District 11 BMP sites during the Vector Control Background Monitoring Study. Comparisons are based on the relative abundance of mosquitoes at each BMP site calculated for the entire period of background monitoring. N = 22 for District 7. N = 12 for District 11.

Species	District 7, Los Angeles		District 11, San Diego	
	CO2-baited light	Gravid	CO2-baited light	Gravid
<i>Aedes increpitus</i>	0.024 \pm 0.023	0.001 \pm 0.001	0.069 \pm 0.056	0.007 \pm 0.005
<i>Ae. nigromaculis</i>	0 \pm 0	0 \pm 0	0.003 \pm 0.003	0.001 \pm 0.001
<i>Ae. squamiger</i>	0 \pm 0	0 \pm 0	0.003 \pm 0.003	0.001 \pm 0.001
<i>Anopheles franciscanus</i>	0.006 \pm 0.004	0 \pm 0	0 \pm 0	0 \pm 0
<i>An. hermsi</i>	0.023 \pm 0.023	0 \pm 0	0.007 \pm 0.006	0.002 \pm 0.002
<i>Culex erythrothorax</i>	0.006 \pm 0.006	0 \pm 0	0.135 \pm 0.076	0.052 \pm 0.029
<i>Cx. quinquefasciatus</i>	0.754 \pm 0.071	0.980 \pm 0.007	0.564 \pm 0.096	0.913 \pm 0.034
<i>Cx. tarsalis</i>	0.031 \pm 0.014	0.003 \pm 0.002	0.174 \pm 0.055	0.021 \pm 0.012
<i>Culiseta incidens</i>	0.029 \pm 0.014	0.001 \pm 0.001	0.013 \pm 0.006	0.003 \pm 0.001
<i>Cs. inornata</i>	0.035 \pm 0.016	0.006 \pm 0.002	0.032 \pm 0.012	0 \pm 0

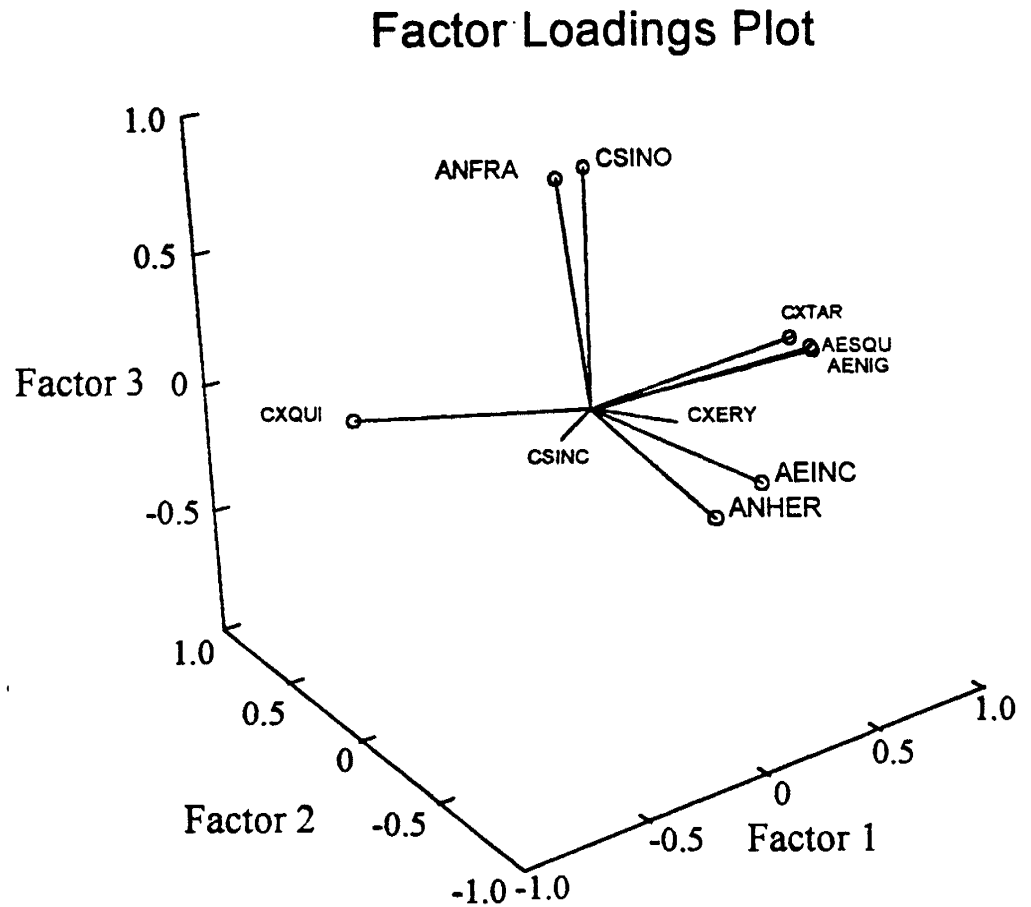


Fig. 7. Position of mosquito species from Districts 7 and 11 on the first three principal components using collections from carbon dioxide-baited light traps. LA sites 7 and 16 were not included in the analysis. Species names are abbreviated as the genus abbreviation and the first three letters of the species: e.g., *Culex quinquefasciatus* = CXQUI.

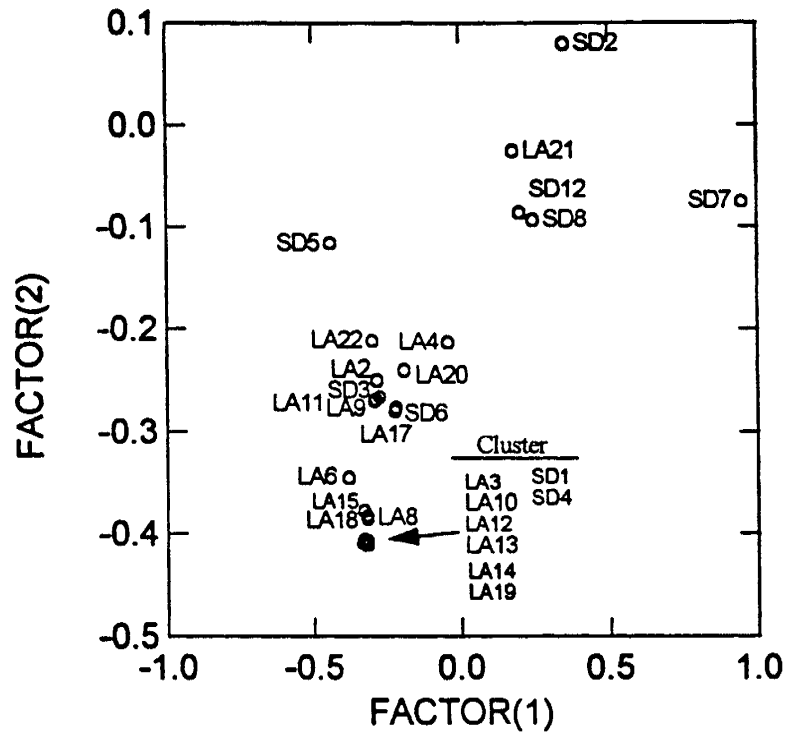


Fig. 8. Position of District 7 and 11 BMP sites on principal components (factors) 1 and 2 from an analysis using carbon dioxide-baited light trap catches. LA = Los Angeles. SD = San Diego. LA sites 7 and 16 were not included in the original analysis. Mosquito species composition at LA sites 1 and 5, and SD sites 10 and 11, was significantly different from the sites illustrated; these sites and SD site 9 lie outside the coordinates illustrated.

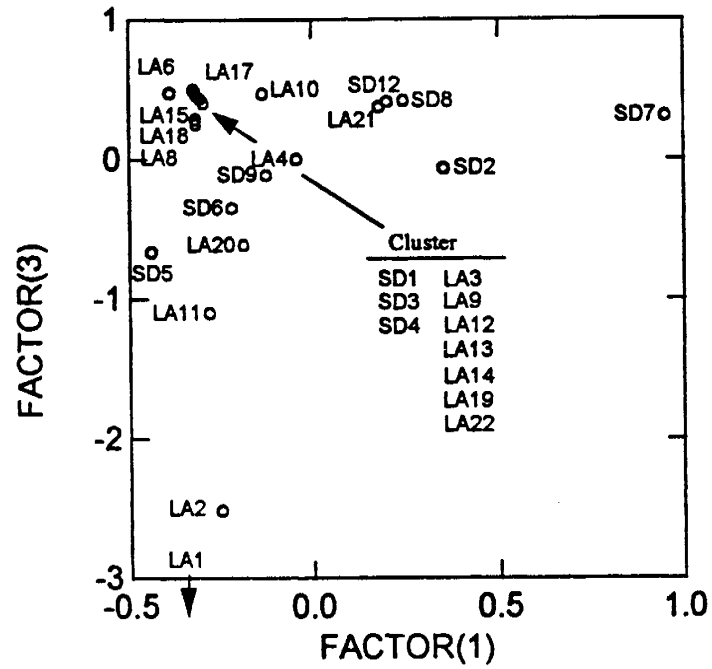


Fig. 9. Position of District 7 and 11 BMP sites on principal components (factors) 1 and 3 from an analysis using carbon dioxide-baited light trap catches. LA = Los Angeles. SD = San Diego. LA sites 7 and 16 were not included in the original analysis. Mosquito species composition at LA sites 1 and 5, and SD sites 10 and 11, was significantly different from the sites illustrated; these sites and SD site 9 lie outside the coordinates illustrated.

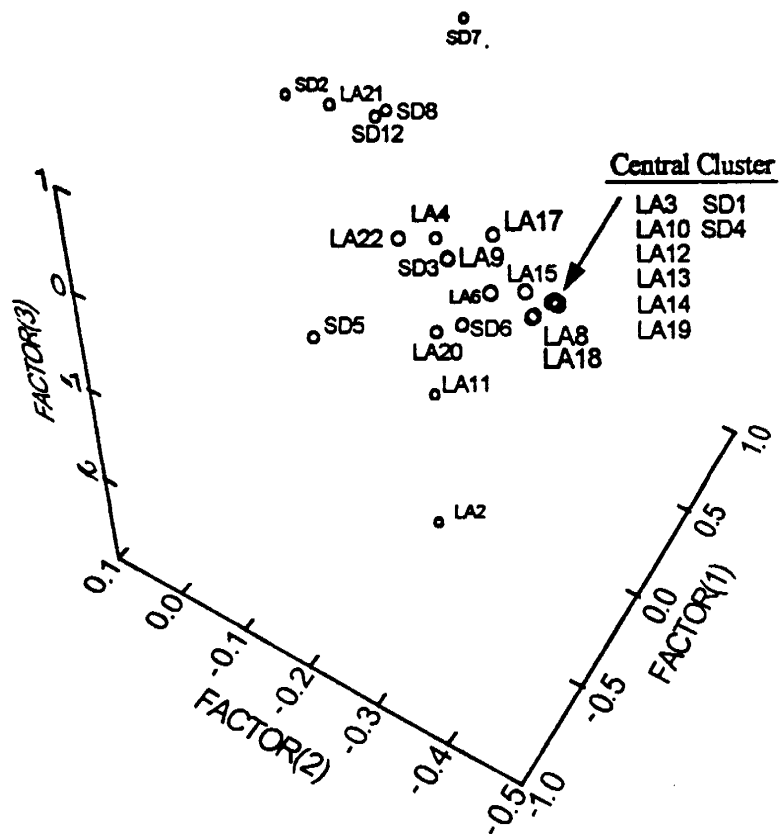


Fig. 10. Three-dimensional plot of positions for District 7 and 11 BMP sites on the principal components using carbon dioxide-baited light trap catches. LA = Los Angeles. SD = San Diego. LA sites 7 and 16 were not included in the original analysis. Mosquito species composition at LA sites 1 and 5, and SD sites 10 and 11, was significantly different from the sites illustrated; these sites and SD site 9 lie outside the coordinates illustrated.

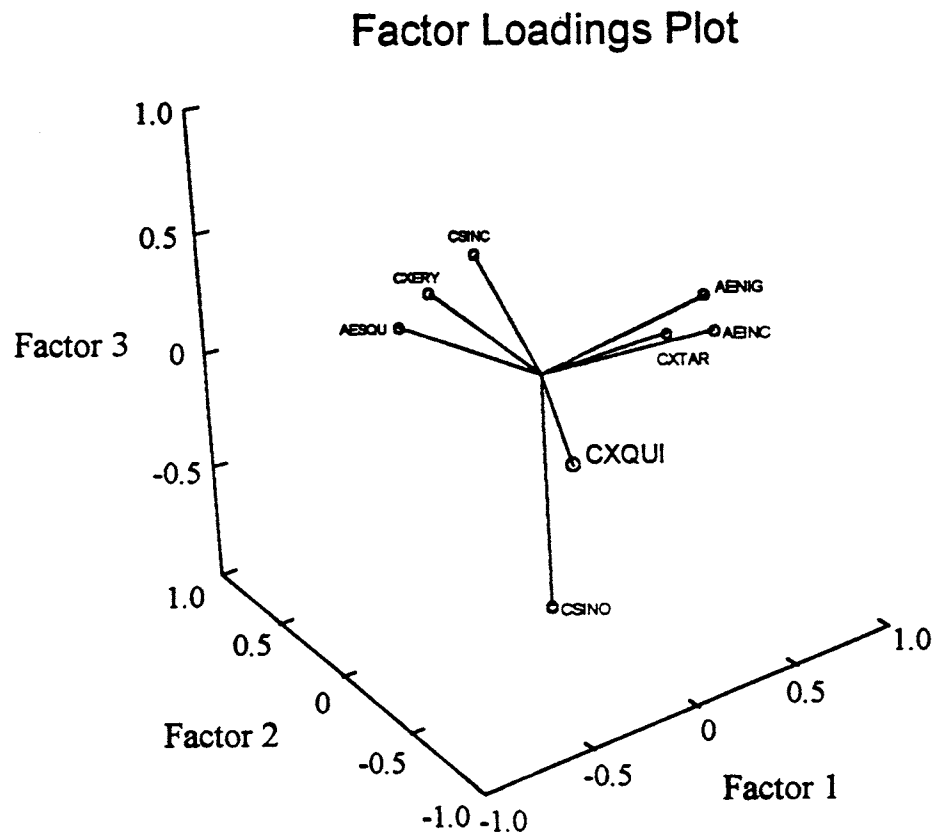


Fig. 11. Three-dimensional plot of positions for mosquito species from District 7 and 11 BMP sites on the principal components using gravid trap catches. Species names are abbreviated using the genus abbreviation and the first three letters of the species: e.g., *Culex quinquefasciatus* = CXQUI.

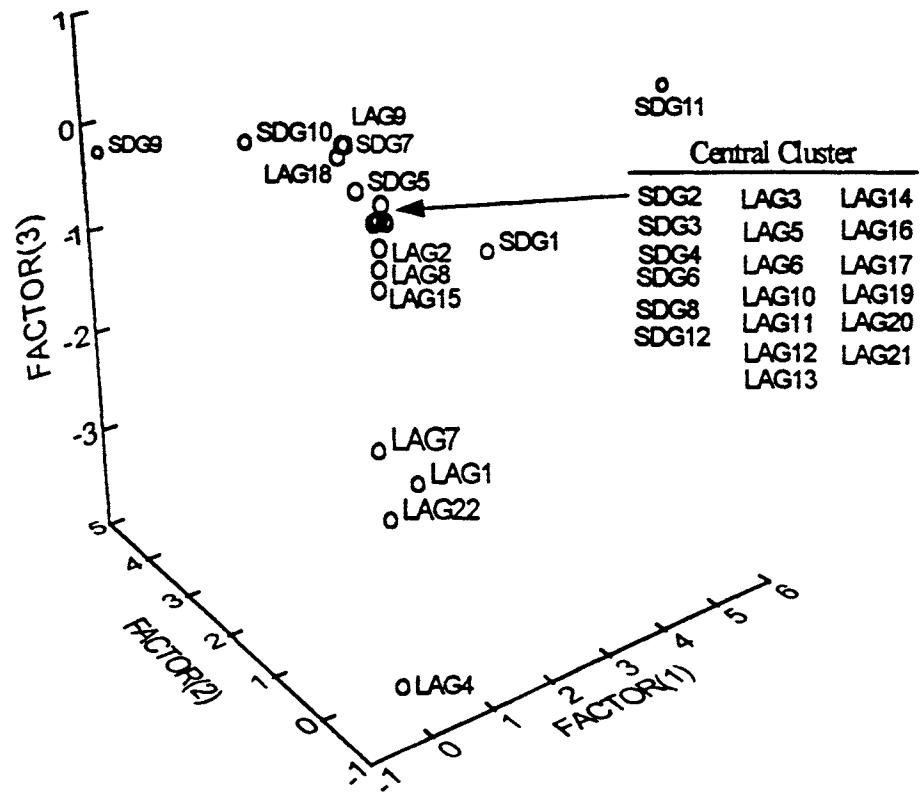


Fig. 12. Positions of BMP sites from District 7 and 11 BMP sites on the principal components (factors) using collections from gravid trap catches. LA = Los Angeles. SD = San Diego.

Midges:

Abundance

Background levels of midge abundance at the BMP sites were generally low (< 10 individuals per trap night: Figs. 13 and 14). Despite exhibiting sporadic increases of abundance, only five sites in District 7 had midge populations in excess of 50 individuals per trap night (Fig. 13): sites 1, 2, 4, 5 and 14. Carbon dioxide-baited light traps at three of the Pacoima sites collected substantial numbers (> 30 individuals per trap night) of midges during August and early September. After mid-September, midges were rare at the Pacoima sites. A short-lived increase in midge abundance occurred in August at site 14 in Downey and in October at the site 5 in Malibu. A total of 1757 midges were collected districtwide during the background monitoring study. Eight (8) morphotypes were collected. Five morphotypes (Table 6) were common (percent of individuals collected: morphotype 1: 28%; morphotype 4: 20%; morphotype 3: 16% morphotype 6: 12%; morphotype 5: 11%).

Even though many of the San Diego BMP sites were adjacent to wetlands, midge abundance in carbon dioxide-baited light traps in District 11 was even lower than in District 7. No site had more than 30 individuals per trap night. Only 296 individuals were collected districtwide, giving an average of 25 midges per trap for the entire monitoring period (Fig. 14). The species composition at the San Diego sites differed somewhat from the Los Angeles sites. Two morphotypes (morphotypes 2 and 10) that were comparatively rare (< 8% of the individuals collected) in District 7 were among the most abundant midges collected in District 11; each species represented about 17% of the individuals collected. *Cricotopus* spp. (morphotype 1) was comparatively rare (6%) among individuals collected in District 11. *Chironomus* spp. (morphotype 4) was most abundant (20% of individuals).

Morphotypes represented, for the most part, a single subfamily group consisting of 1 or 2 genera (Table 6). Morphotype 3 comprised a diverse group of midges in six genera. Twenty-one (21) species among fourteen (14) genera were collected during the background monitoring study. Eleven (11) genera were represented by a single species. Two undescribed (new) species were found.

Median midge abundance was significantly associated with host-seeking mosquito abundance across BMP sites within each of the two Caltrans districts (District 7: $r = 0.61$; District 11: $r = 0.94$). The differences in the median abundance values among the sites were greater than would be expected by chance (District 7: $\chi^2_{21} = 53.6$, $P < 0.001$) and (District 11: $\chi^2_{11} = 37.8$, $P < 0.001$). Because the differences among medians for the District 7 sites were extremely small (range: 0 to 2), host-seeking mosquito abundance at any particular site was not consistently different during the period of background monitoring. Midge abundance at site 10 was significantly greater than at other San Diego sites.

While it is possible that vernal midge populations might be larger than those found during the summer and autumn 1998, data collected to date indicate that background levels for midge abundance were not high at any of the BMP sites.

Table 6. Species identifications for the eight chironomid morphotypes collected during the Background Monitoring Study, July - December 1998.

Morphotype	Subfamily (-nae) or tribe (-ini) genus and species (<i>italics</i>)
1. yellow and black-banded	Orthocladiinae <i>Cricotopus bicinctus</i> Meigen <i>C. (C.) infuscatus</i> (Malloch) <i>Cricotopus sylvestris</i> (Fab.) <i>C. trifascia</i> Edwards <i>Cricotopus</i> n. sp. 1 (Spies, in manuscript)
2. large brown	Chironomini <i>Chironomus anonymus</i> Williston <i>C. calligraphus</i> Goeldi
3. small brown	Tanypodinae <i>Procladius sublettei</i> Roback <i>Pentaneura inconspicua</i> (Malloch)
	Orthocladiinae <i>Cricotopus (C.) infuscatus</i> (Malloch) <i>Cricotopus</i> n.sp. 1 (Spies, in manuscript) <i>Smittia aterrima</i> (Meigen)
	Chironomini <i>Dicrotendipes californicus</i> (Johannsen)
	Tanytarsini <i>Micropsectra nigripilia</i> (Johannsen)
4. large green	Chironomini <i>Chironomus anonymus</i> Williston <i>C. decorus</i> Johannsen [= <i>attenuatus</i> , of auct.]
5. small green	Tanytarsini <i>Tanytarsus dendyi</i> Sublette <i>Tanytarsus</i> n.sp.

Table 6. continued.

6. light brown with patterned wings	<p>Tanypodinae <i>Ablabesmyia mallochi</i> (Walley) <i>Thiemannimyia barberi</i> (Coquillett)</p> <p>Chironomini <i>Polypedilum obelos</i> Sublette & Sasa</p>
7. black or shiny dark brown	<p>Orthoclaadiinae <i>Pseudosmittia nanseni</i> (Kieffer)</p> <p>Chironomini <i>Apedilum subcinctum</i> Townes</p>
8. brown banded (whitish)	<p>Tanypodinae <i>Labrundinia pilosella</i> (Loew) <i>Pentaneura inconspicua</i> (Malloch)</p>

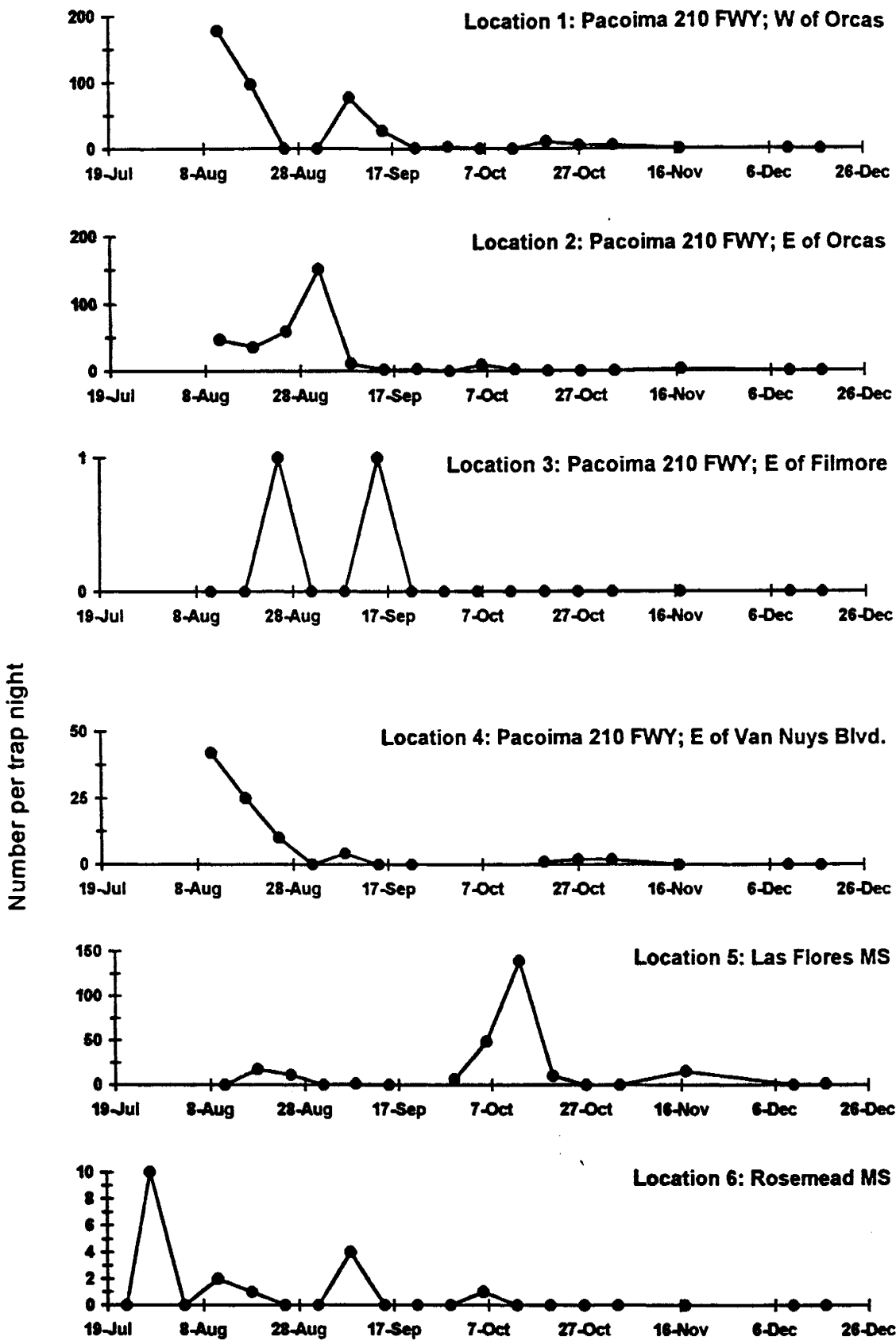


Fig. 13. Abundance of chironomid midges in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Program.

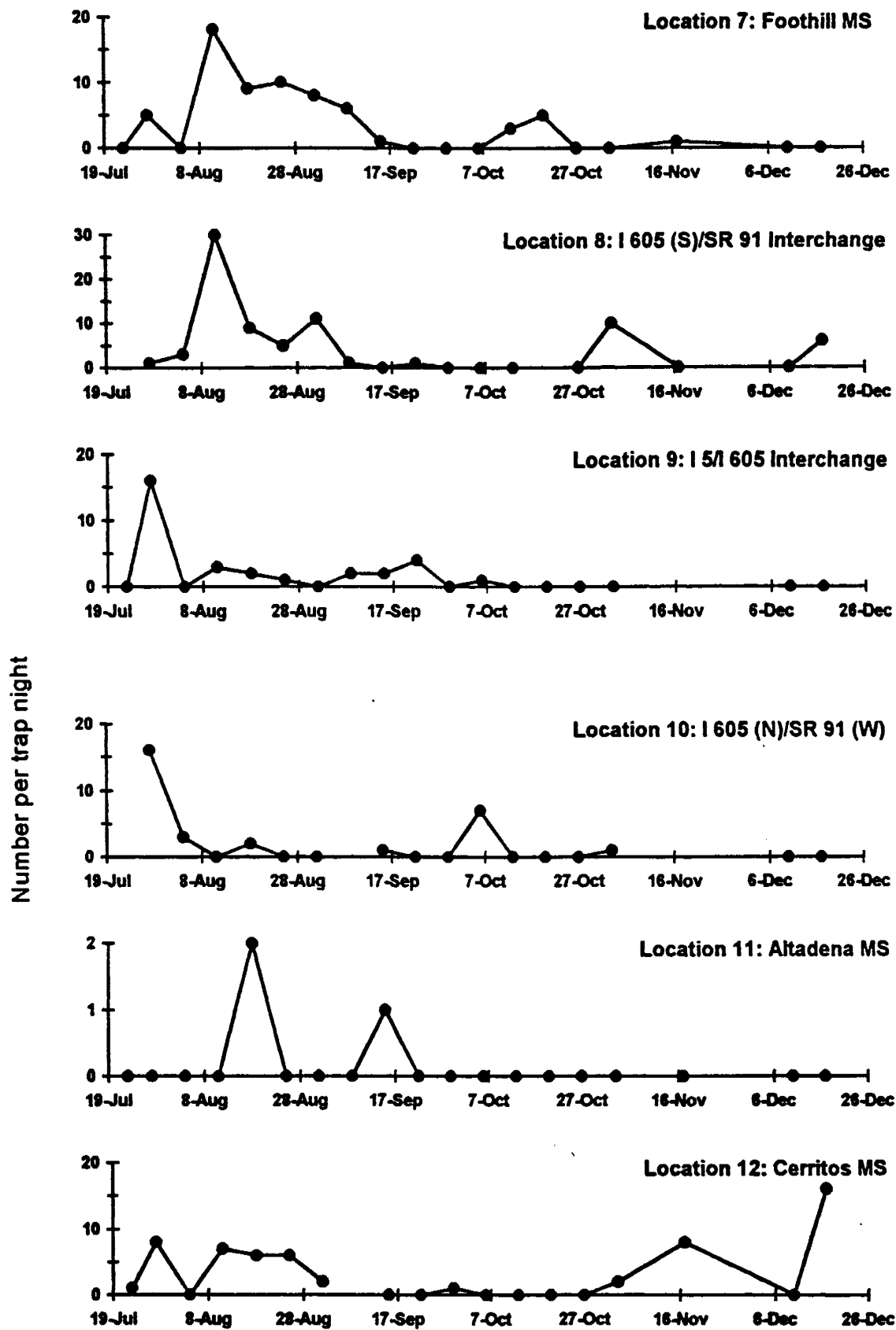


Fig. 13 (continued). Abundance of chironomid midges in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Program.

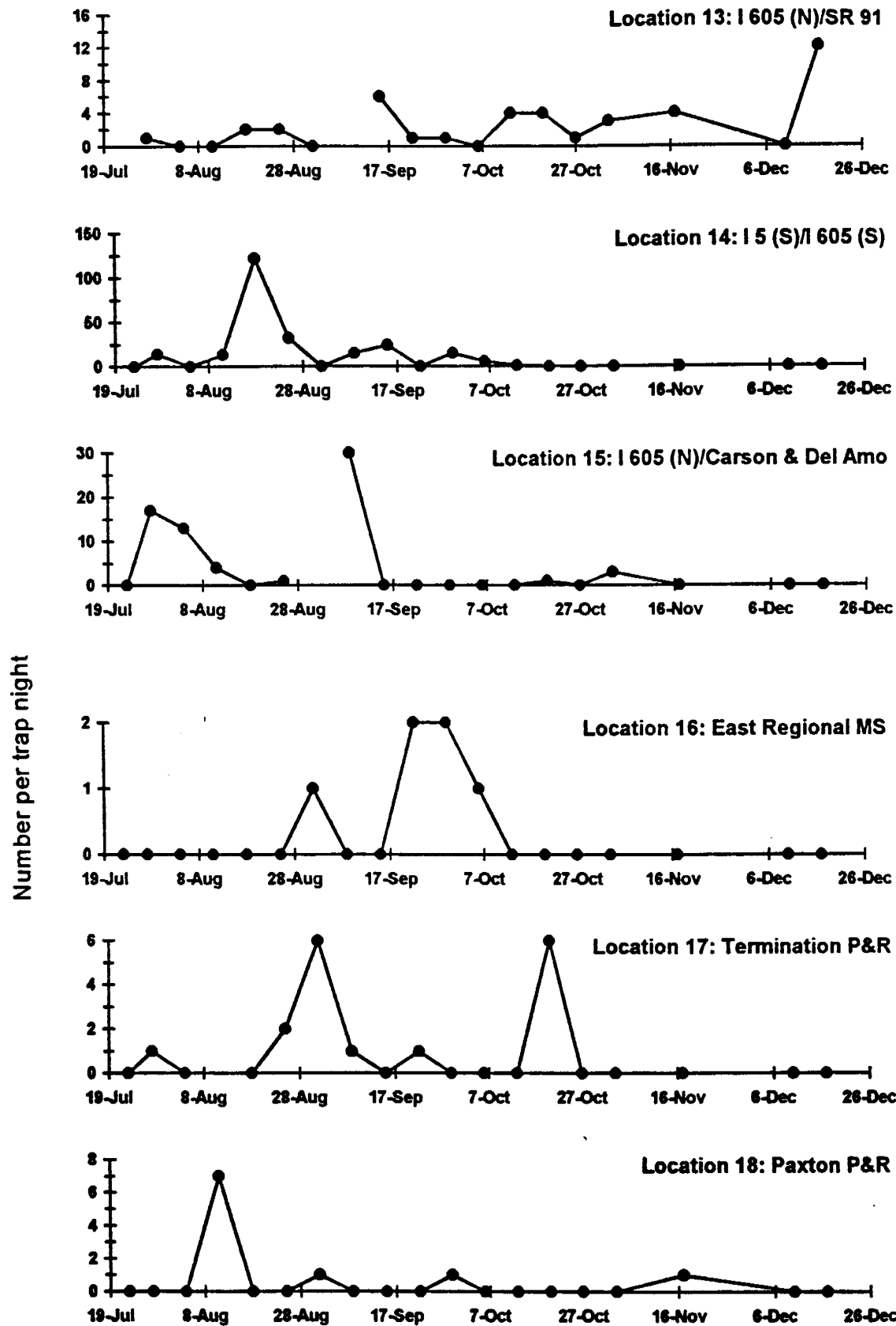


Fig. 13 (continued). Abundance of chironomid midges in carbon dioxide-baited light traps at District 7 BMP sites during the Vector Control Background Monitoring Program.

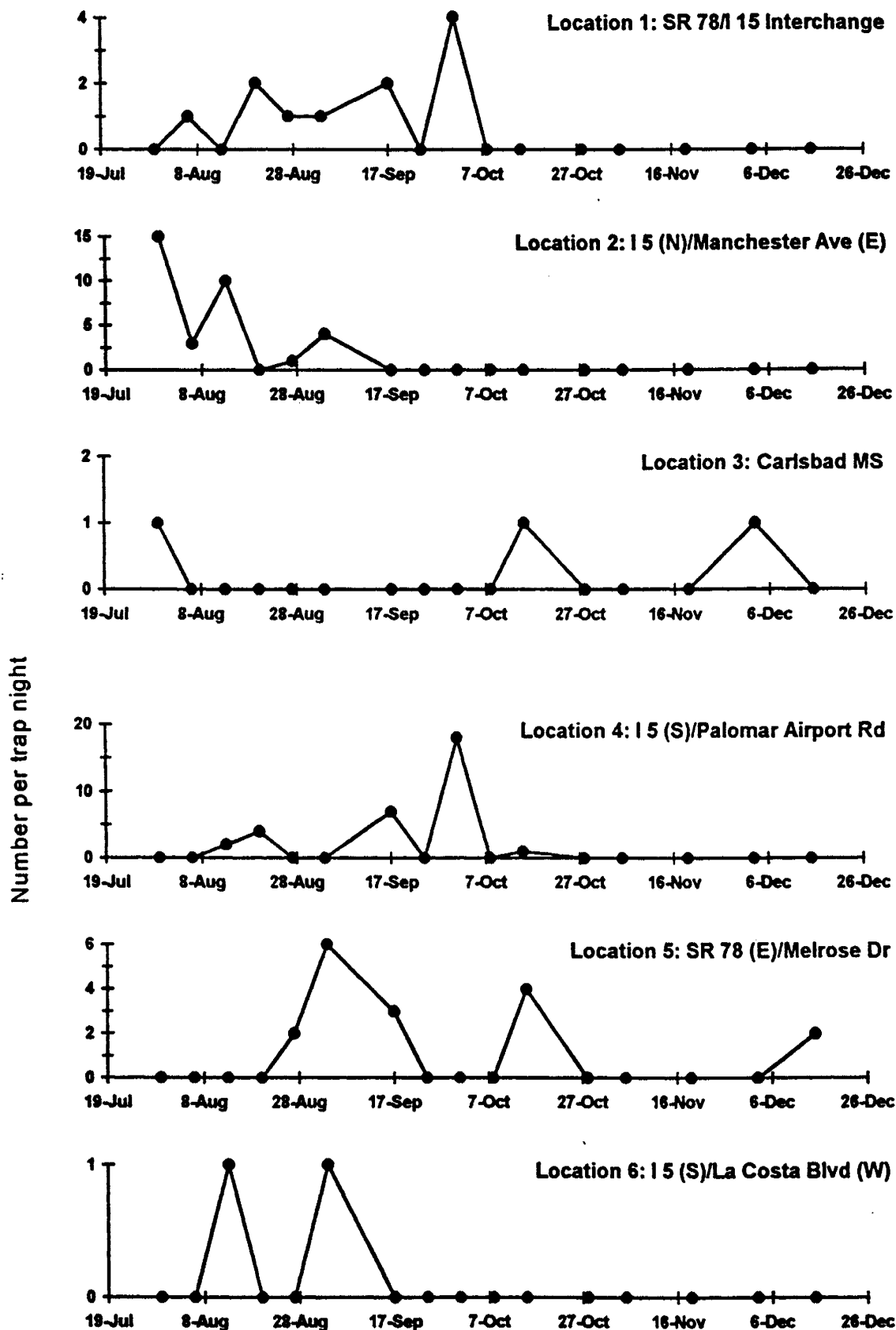


Fig. 14. Abundance of chironomid midges in carbon dioxide-baited light traps at District 11 site during the Vector Control Background Monitoring Study.

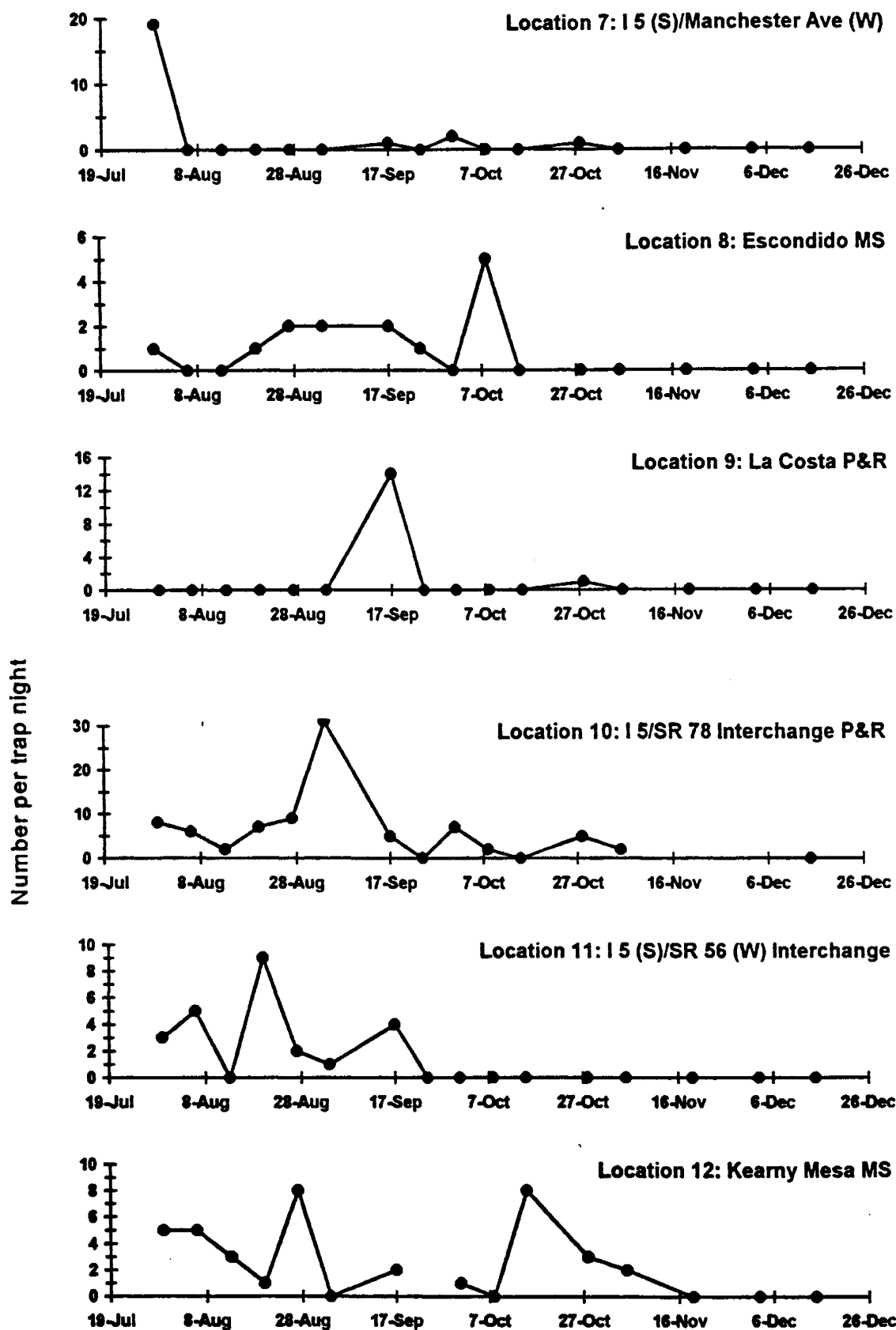


Fig. 14 (continued). Abundance of chironomid midges in carbon dioxide-baited light traps at District 11 site during the Vector Control Background Monitoring Study.

CONCLUSIONS

The ubiquity and abundance of gravid mosquitoes indicated a strong potential for colonization of standing water at BMP sites. Egg-laying mosquitoes were three-fold and ten-fold more abundant than were host-seeking mosquitoes in District 11 and 7, respectively. Background levels of host-seeking mosquitoes and midges were low: on average, fewer than six (6) host-seeking mosquitoes and ten (10) midges were collected per night at most of the sites. The trends for abundance of mosquitoes in carbon dioxide-baited light traps indicate that host-seeking adults at the BMP sites did not show a strong seasonal trend across sites; the trends suggest that the abundance of mosquitoes was influenced more strongly by local conditions than by regional, large-scale factors. Gravid trap collections however showed both regional interdistrict trends, in which activity patterns were roughly equivalent in both districts, and local intradistrict trends where activity patterns were similar for a subset of traps within each of the Caltrans district.

Species composition of the host-seeking and gravid mosquitoes was predominated by the southern house mosquito, *Culex quinquefasciatus*, a potential vector of St. Louis encephalitis virus in urban environments. This mosquito utilizes standing water in habitats ranging from small containers to large organically-enriched ponds as developmental sites. *Culex quinquefasciatus* readily colonizes underground water sources such as catch basins, freeway drains, and flooded utility boxes and cisterns. San Diego BMP sites had proportionately more *Cx. tarsalis*, *Aedes* and *Anopheles* than did the Los Angeles sites. *Culex tarsalis* is the predominant vector of encephalitis viruses to humans in California. *Aedes* species lay eggs in moist soil of intermittently-flooded habitats; therefore, a greater potential for mosquito production from intermittently inundated habitats where water is present for more than one week exists in San Diego. *Anopheles hermsi* is the primary vector of human malaria in San Diego County and poses a significant concern where algal mats develop in seepage water, such as might occur in a wet basin. The site of the wet basin (site 7) had one of the highest background levels of mosquito abundance in District 11. Background levels for mosquitoes were highest at site 5; however, the BMP has a low potential to retain standing water. In addition to site 7, sites 8 through 10 and site 12 (Kearny Mesa MS) are greater concerns than are the other sites in District 11 because of the potential of the BMP to hold standing water and the background levels of gravid mosquitoes.

The Pacoima sites (1, 2, 3, 4, and 18) in District 7 pose the greatest concern among the Los Angeles BMP sites because mosquito abundance is greater than at other sites, two efficient vectors (*Cx. quinquefasciatus* and *Cx. tarsalis*) of encephalitis viruses are present, and the potential for the BMP to have standing water. Both species were also found at sites 20 through 22 where the BMP (MCTT) might retain water. Other sites that merit particularly vigilant monitoring because of their potential to contain standing water (i.e., in conveyance channels at the input and output of the media filter or water within the media filter) and moderate to high levels of background mosquito abundance include sites 17 and 19. Even though the BMPs at sites 7 and 16 also will be media filters, background

levels for mosquitoes were low. Nevertheless, any standing water in the media filters should be monitored for mosquitoes.

The differences in species composition between Los Angeles and San Diego BMP sites are attributed to the comparatively more urbanized sites in District 7 versus the greater diversity of wetland habitats adjacent to sites in District 11, to the localized effects of land use patterns surrounding BMP sites within each district, and, to a lesser extent, the geographical location of sites within southern California. Catches in the two traps across all sites were independent, indicating that both trapping methods are important monitoring methods for the different components of adult mosquito populations at the BMP sites.

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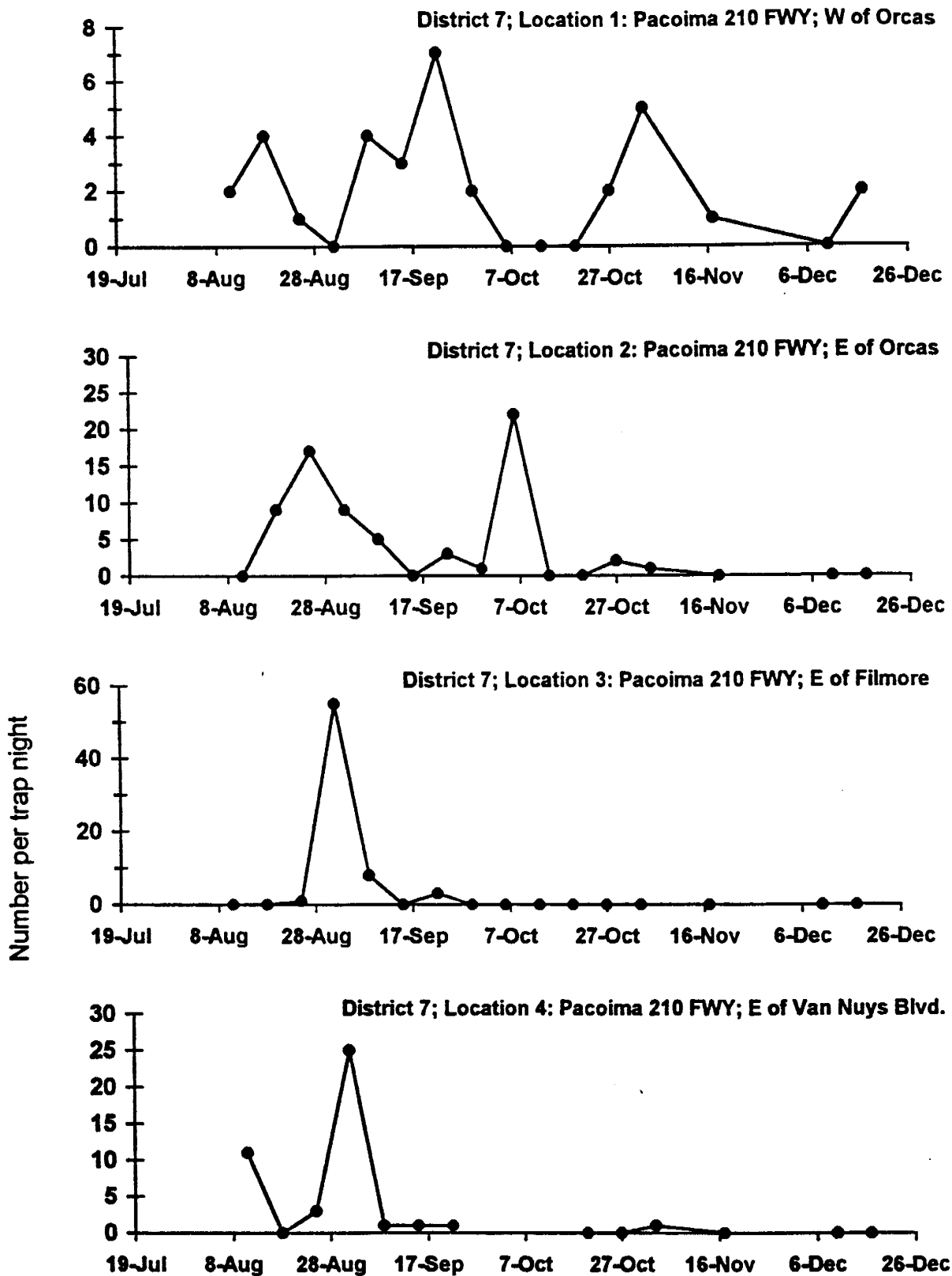
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APPENDIX

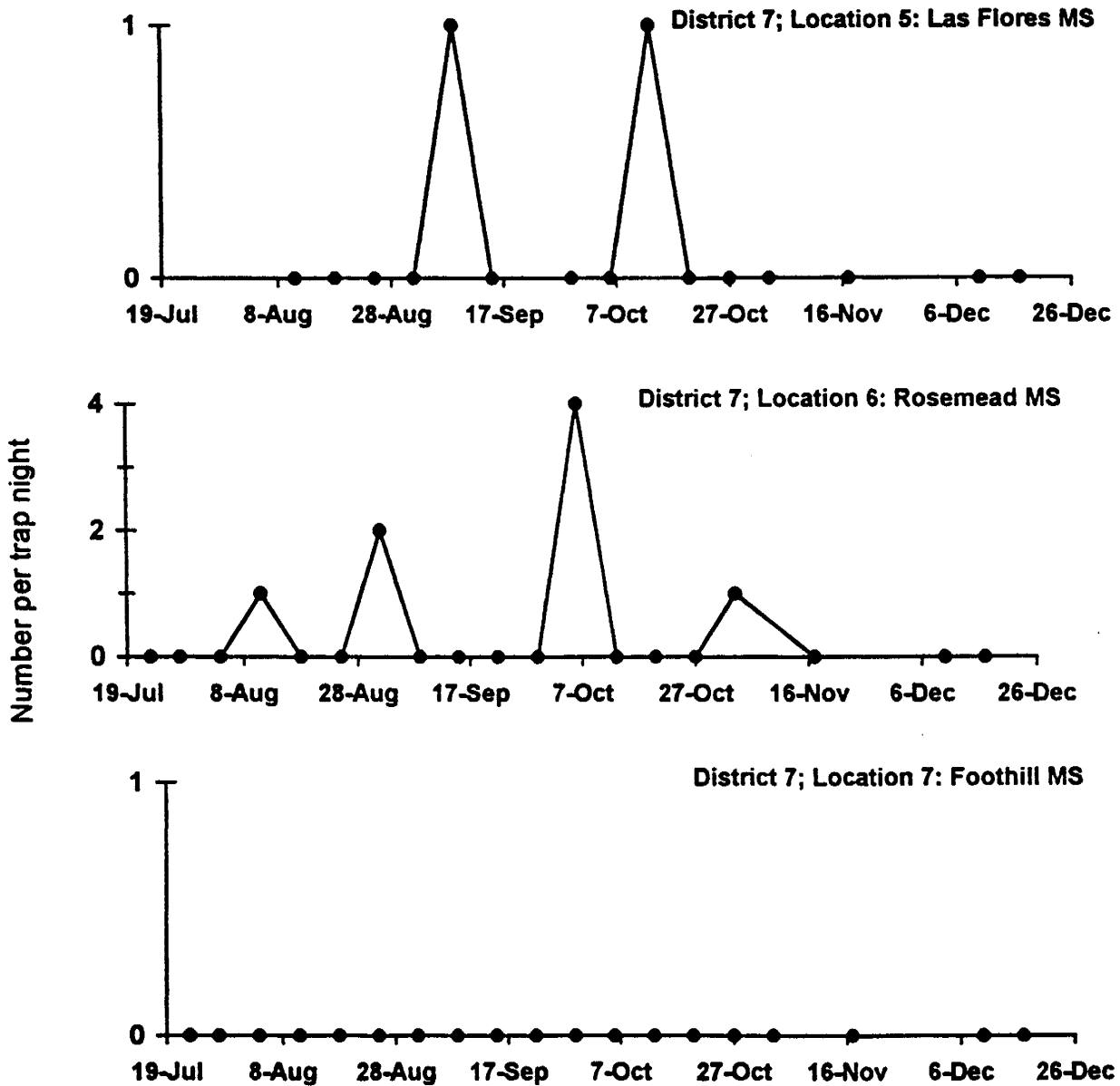
The approach taken in this report has been to examine the background levels of mosquito and midge abundance at thirty-four (34) sites before and during construction of eleven (11) types of stormwater devices. Intra- and interdistrict differences of dipteran abundance at the BMP sites without operational stormwater devices have been the focus of this report. Prospective sites of greatest concern for postconstruction vector control monitoring have been identified. A discussion of vector-related issues for the initial group of BMP designs included in the Scoping Study has been written previously. Nevertheless, it is recognized that pre- and postconstruction comparisons of vector-related issues based on BMP design will be a more meaningful focus for subsequent reports. With that in mind, plots of host-seeking and gravid mosquito, and adult midge, abundance by BMP type (irrespective of location) are included as an appendix to this report.

Trapping Catch Basins



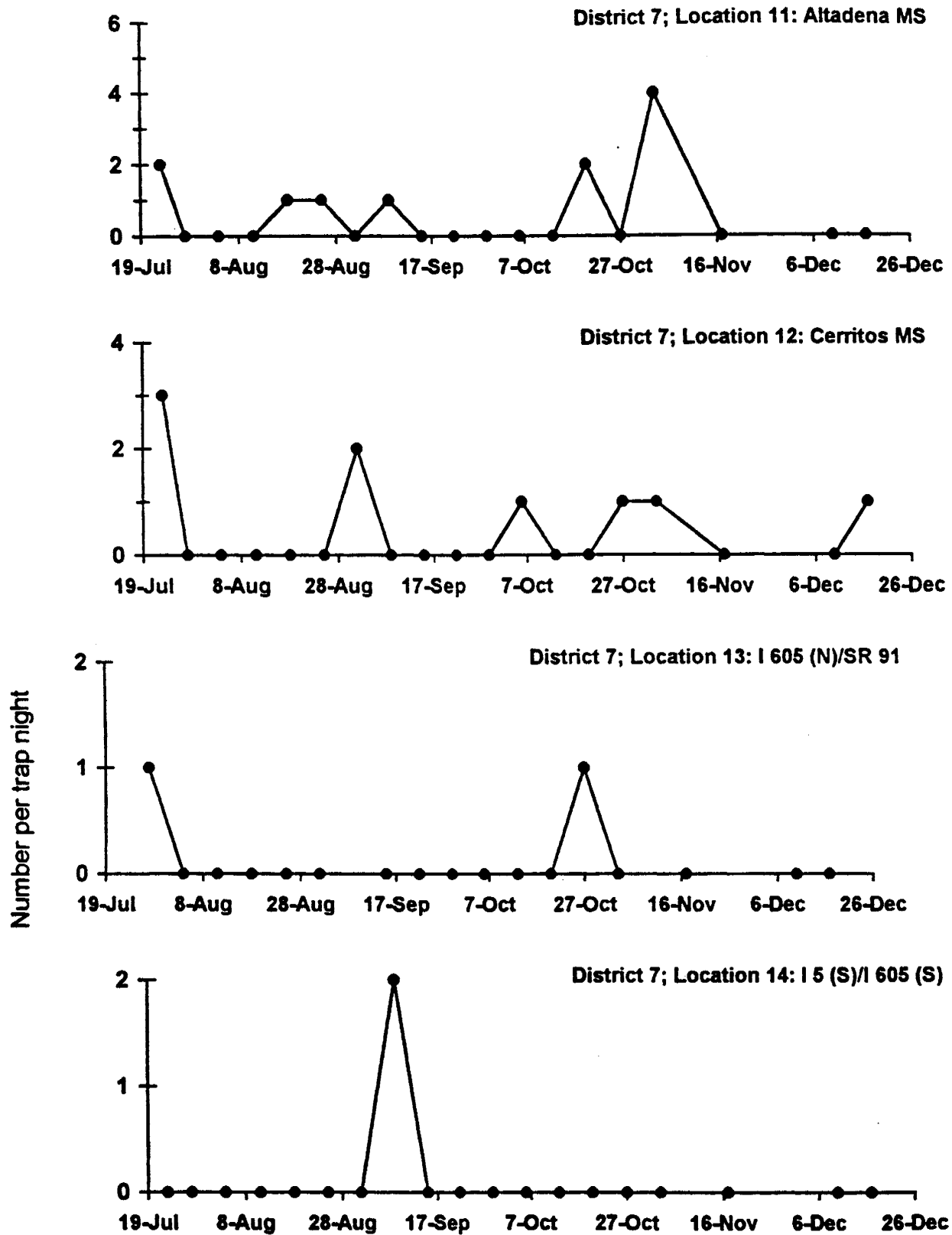
Appendix 1, Fig. 1. Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Catch Basin Inserts



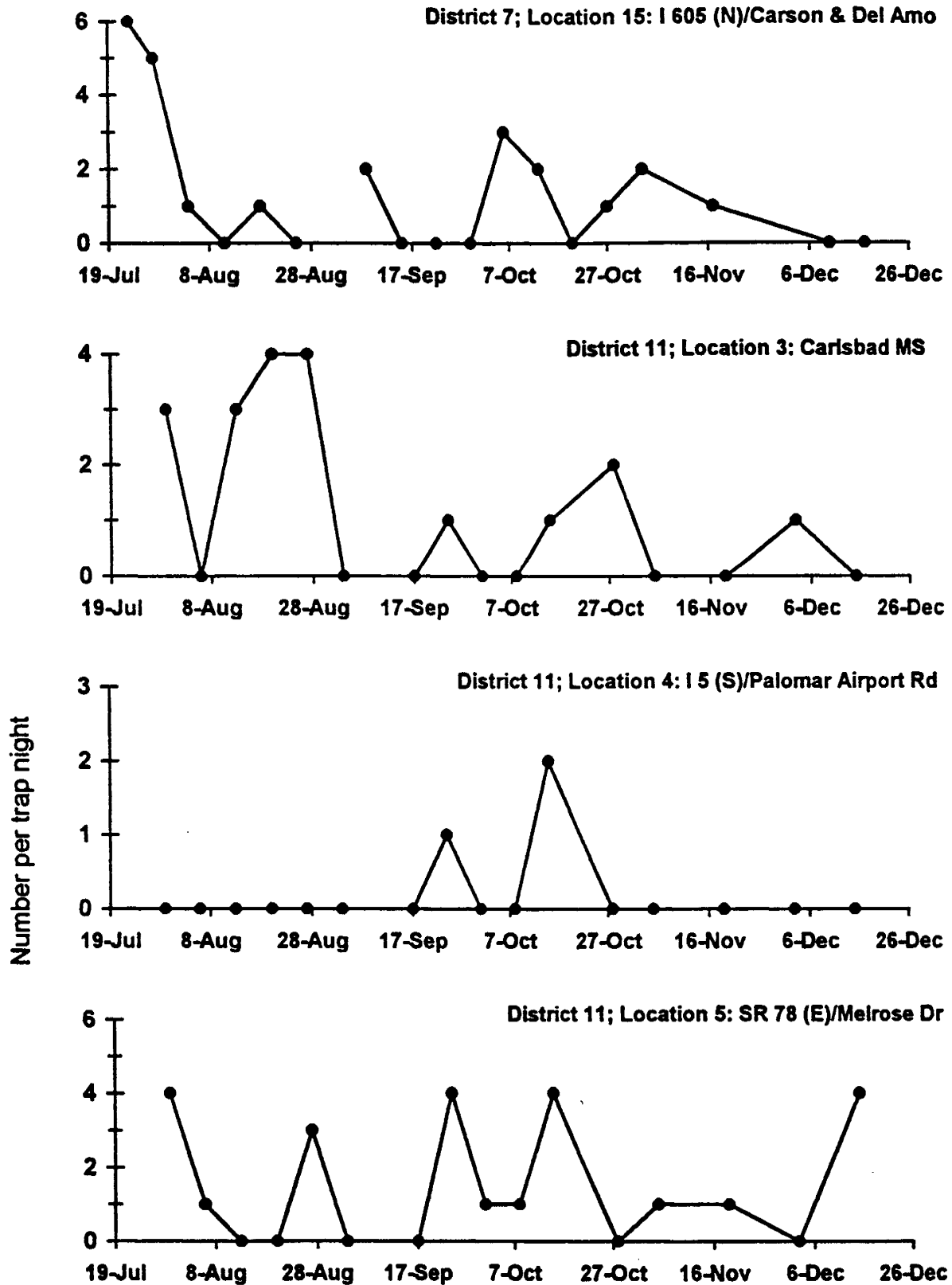
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



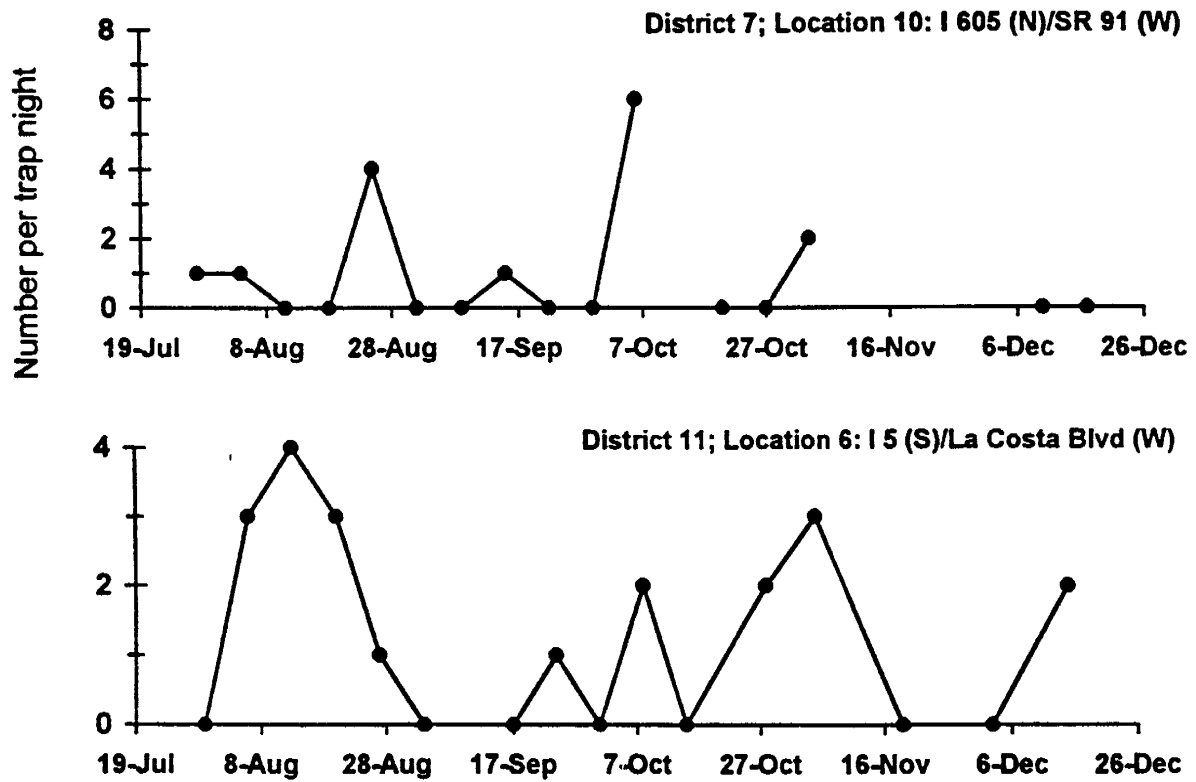
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



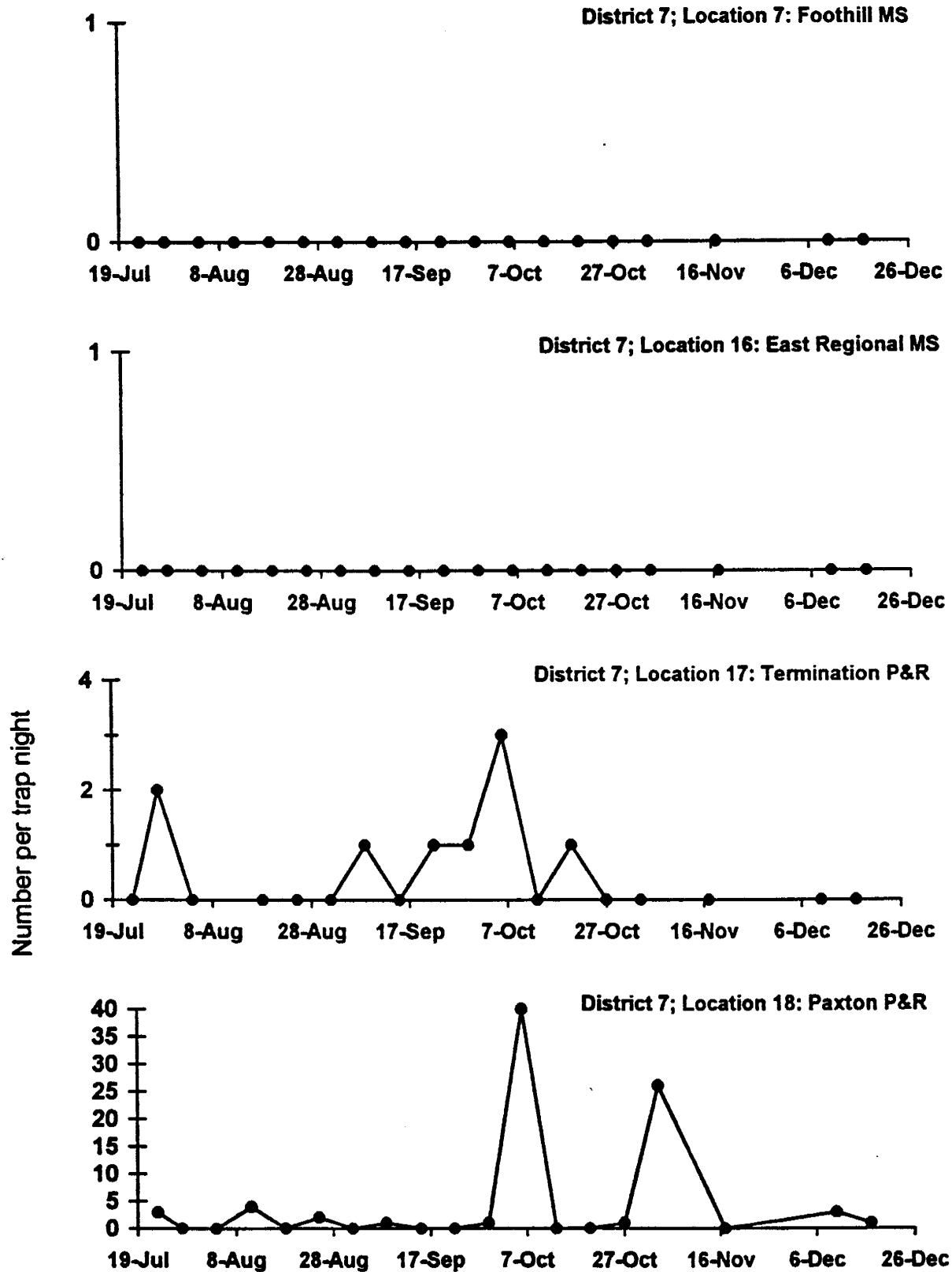
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Basins



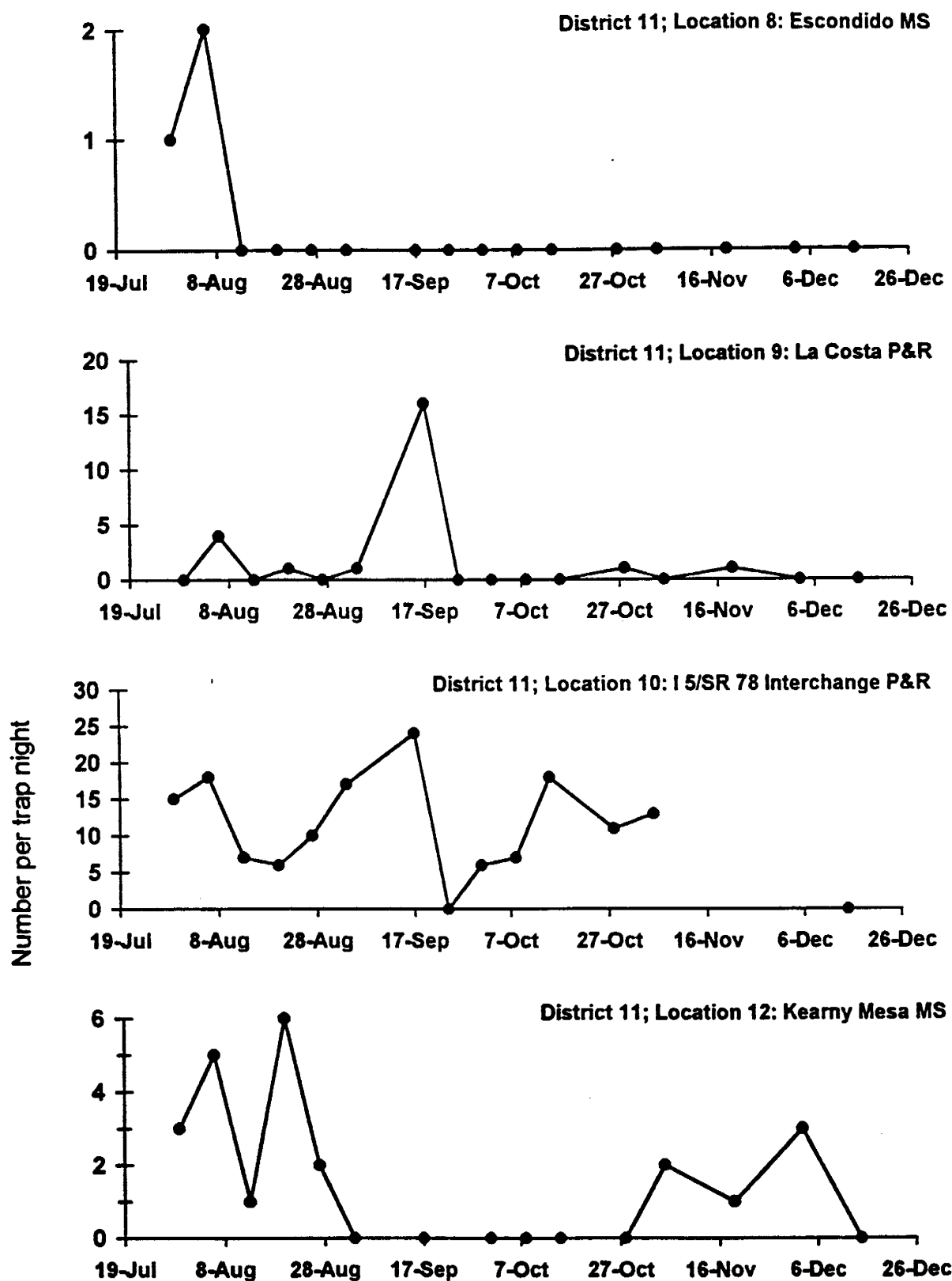
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Media Filters



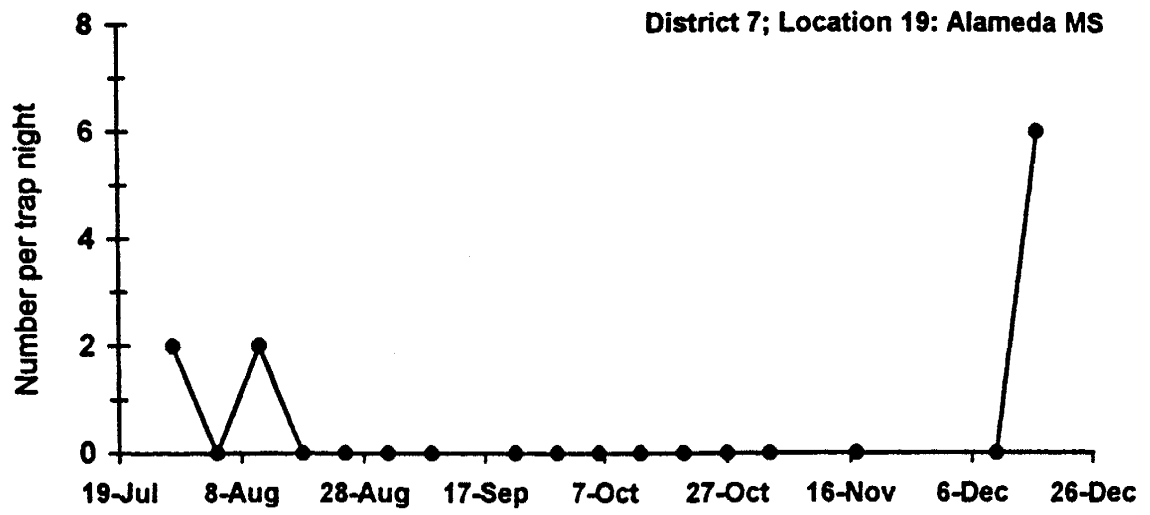
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Media Filters



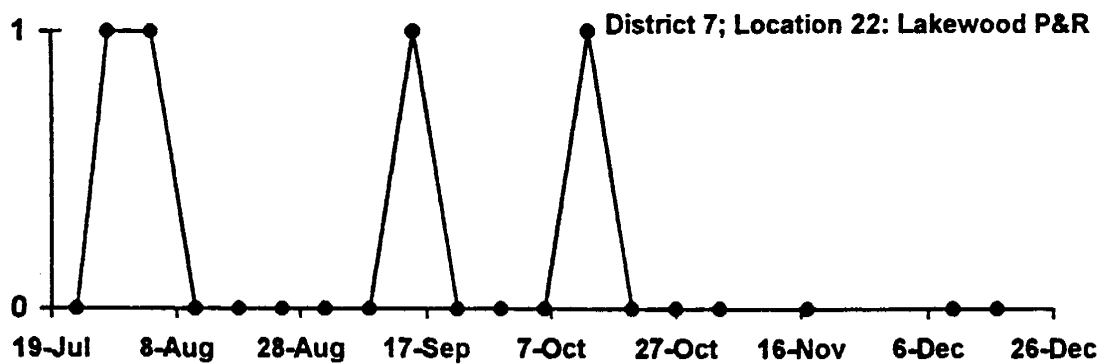
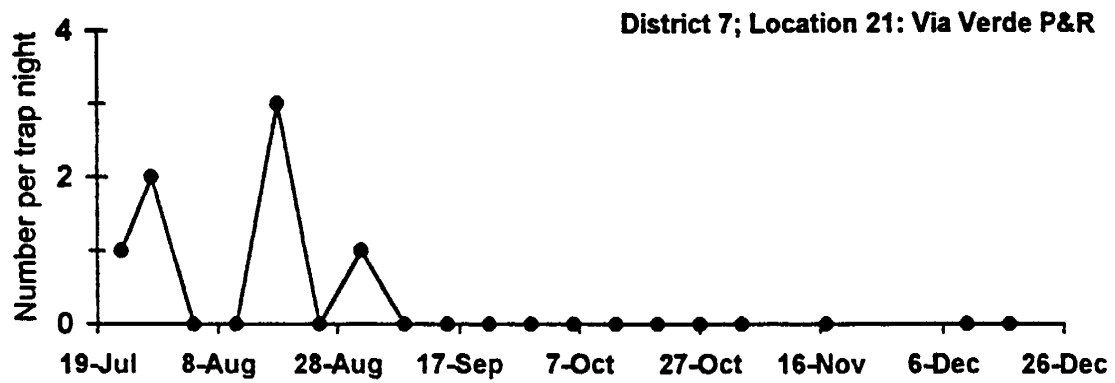
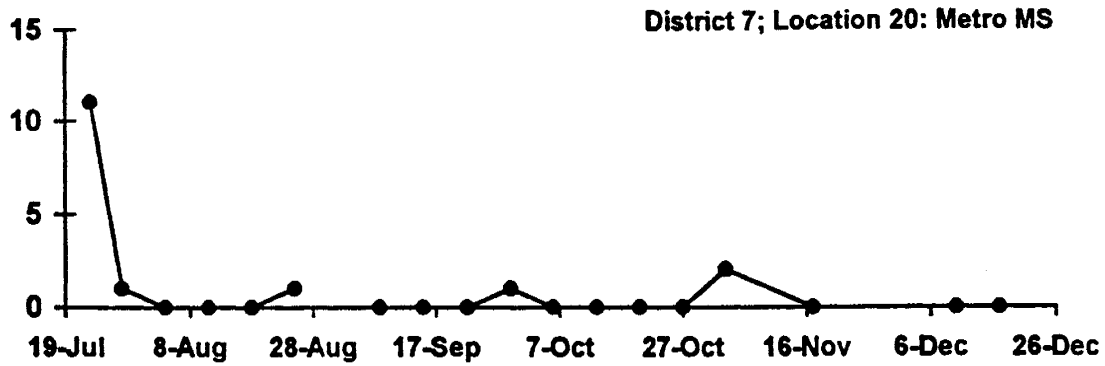
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Oil / Water Separator



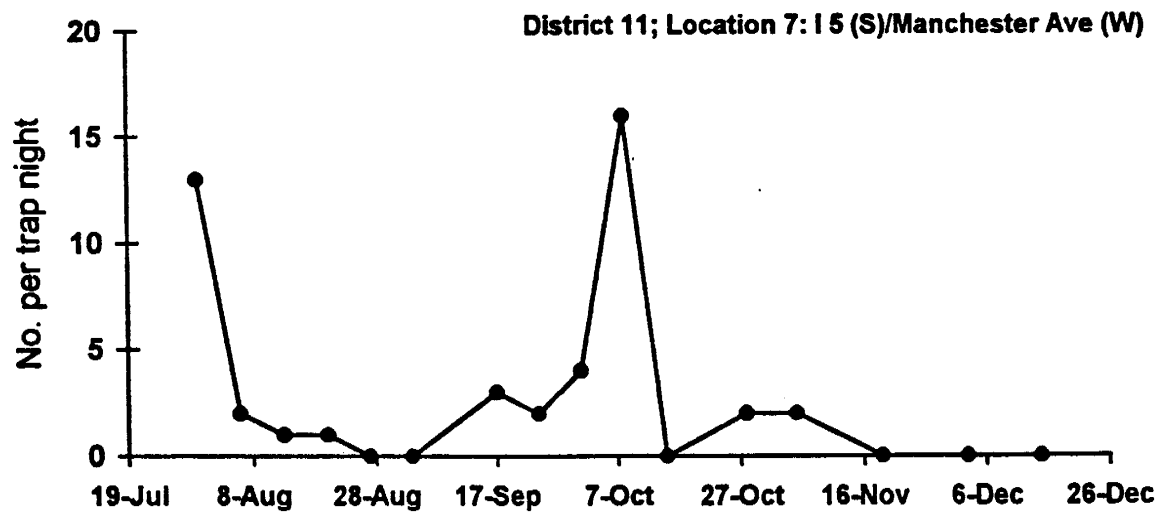
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

M C T T's



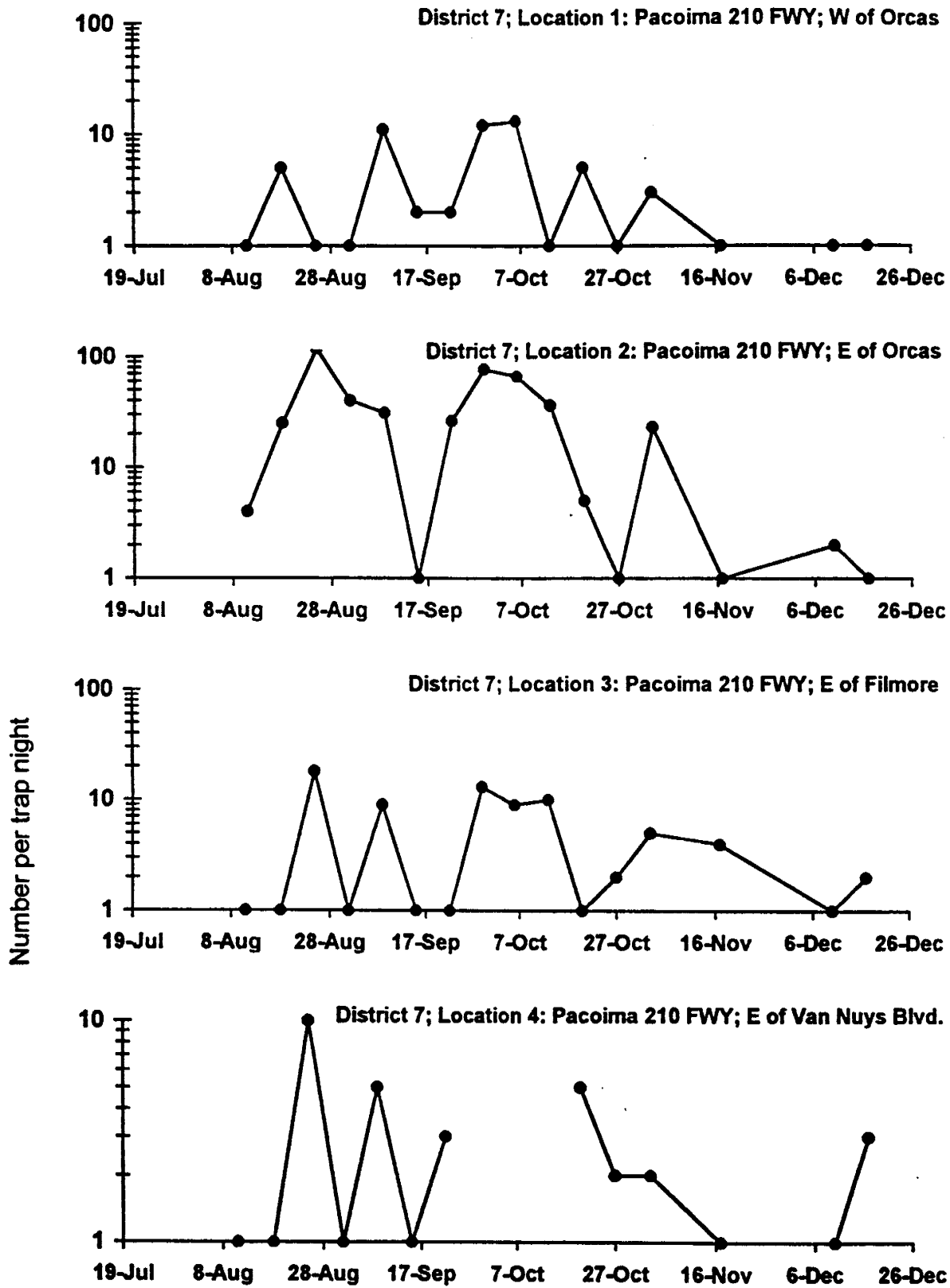
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Wet Basin



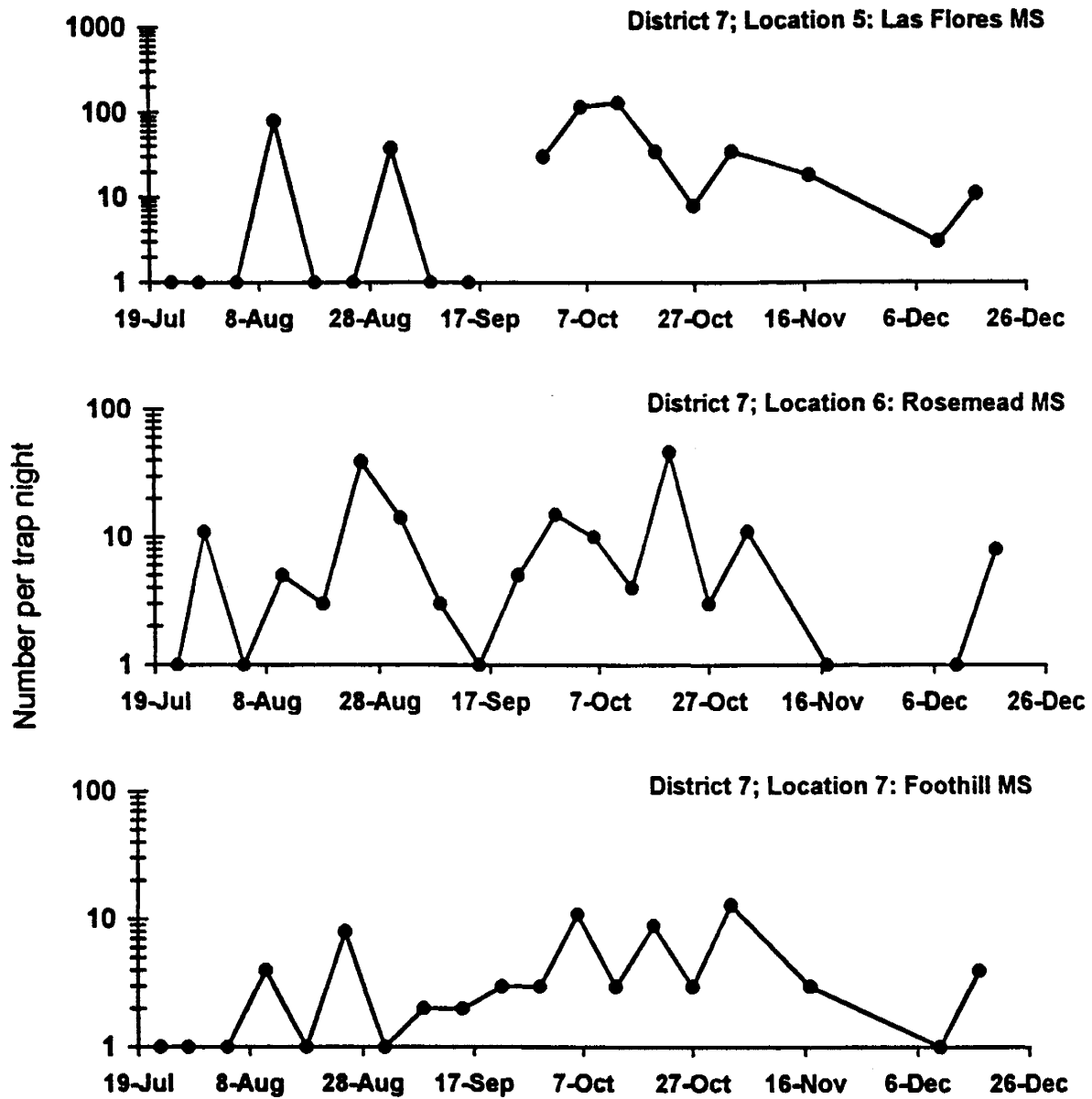
Appendix 1, Fig. 1 (continued). Abundance of host-seeking mosquitoes in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Trapping Catch Basins



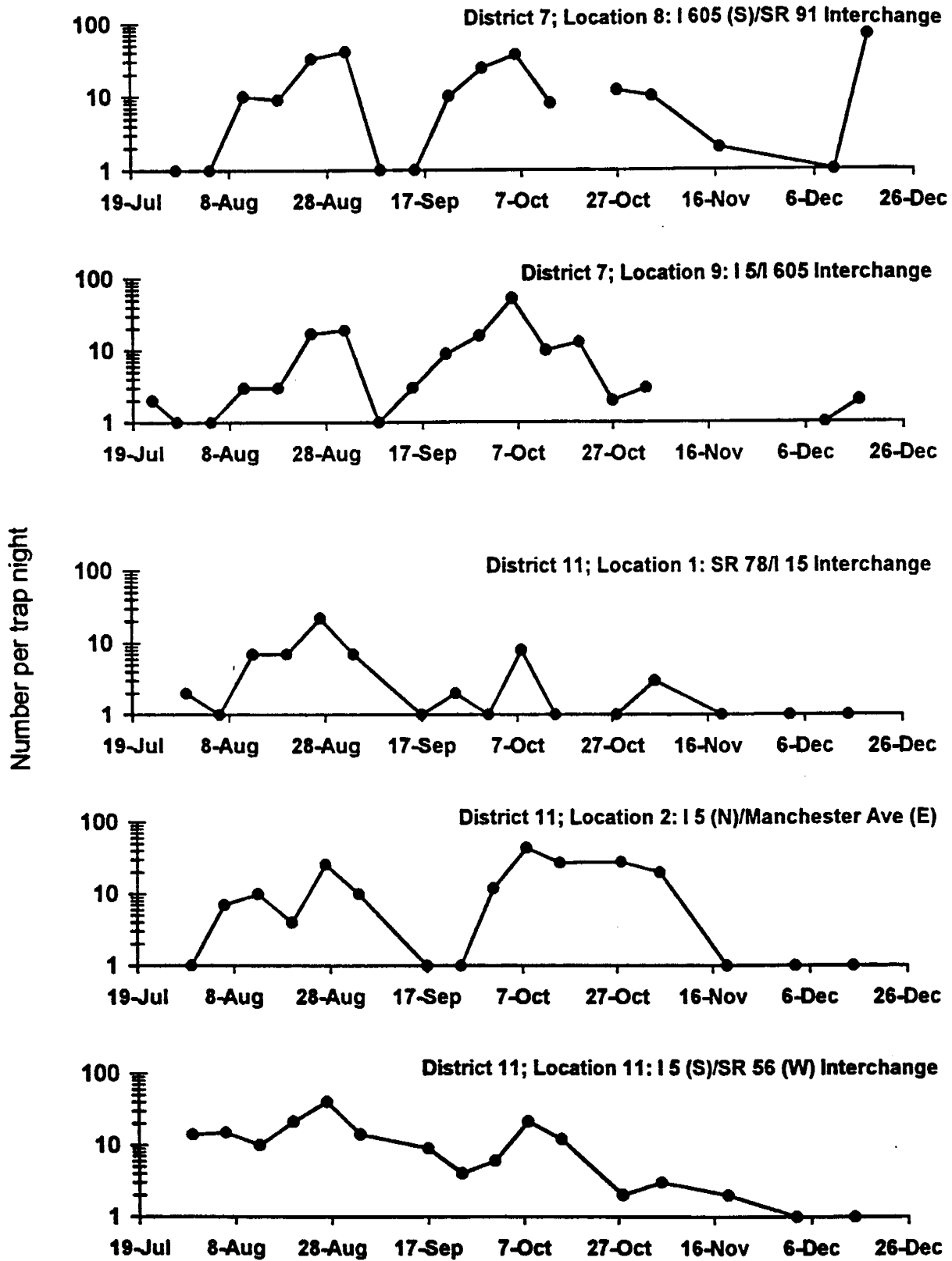
Appendix 1, Fig. 2. Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Catch Basin Inserts



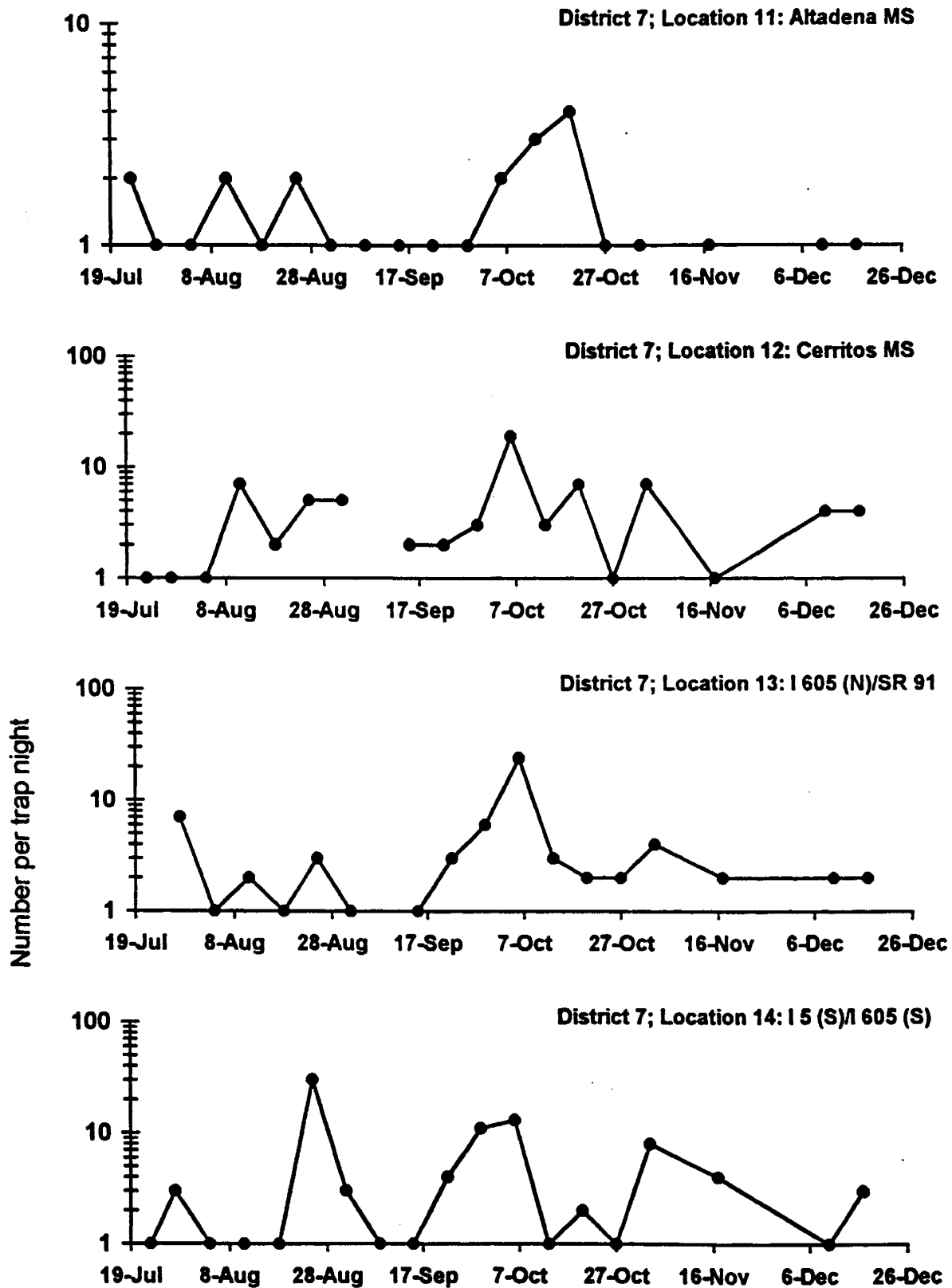
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Extended Detention Basins



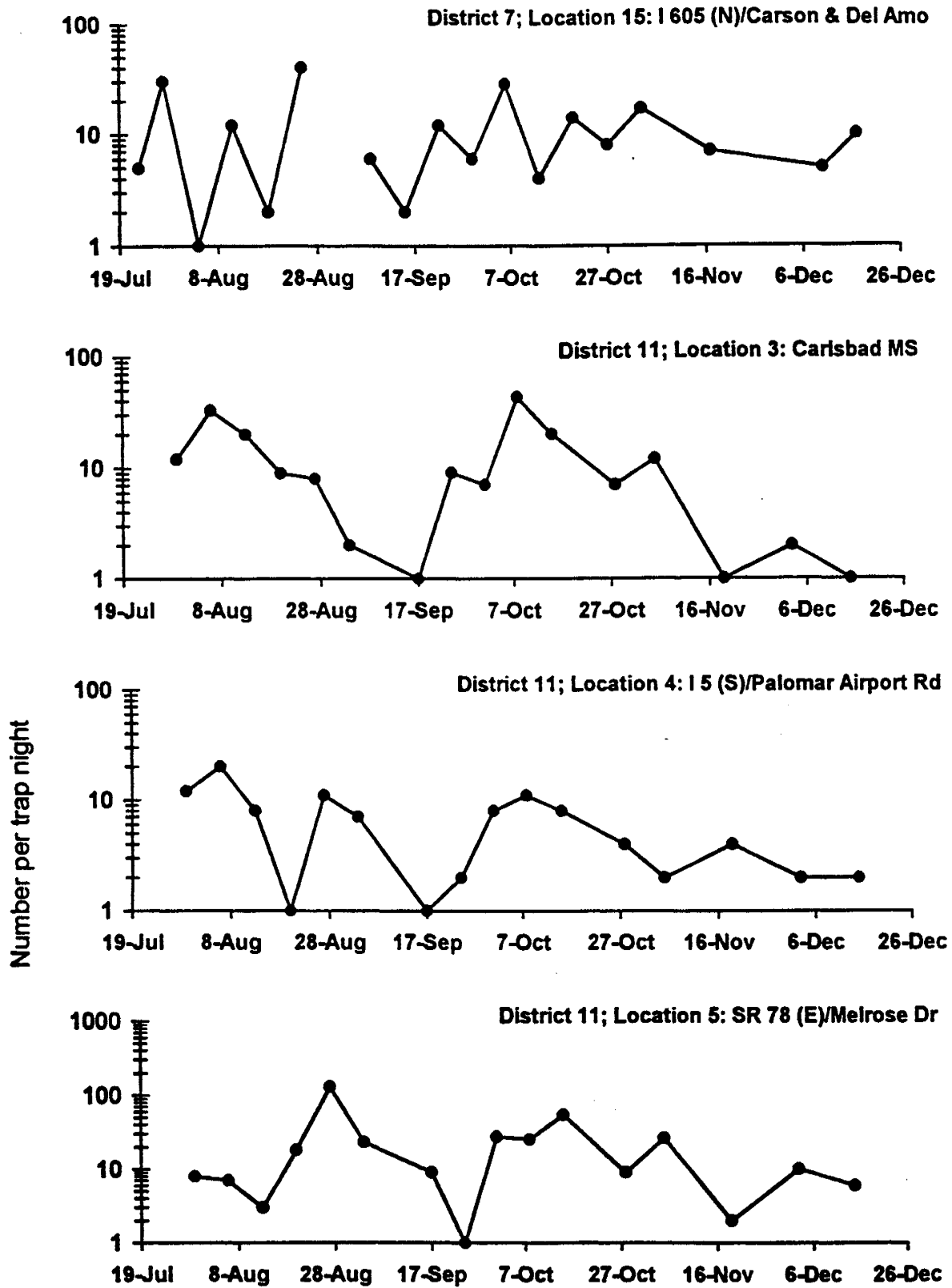
Appendix I, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



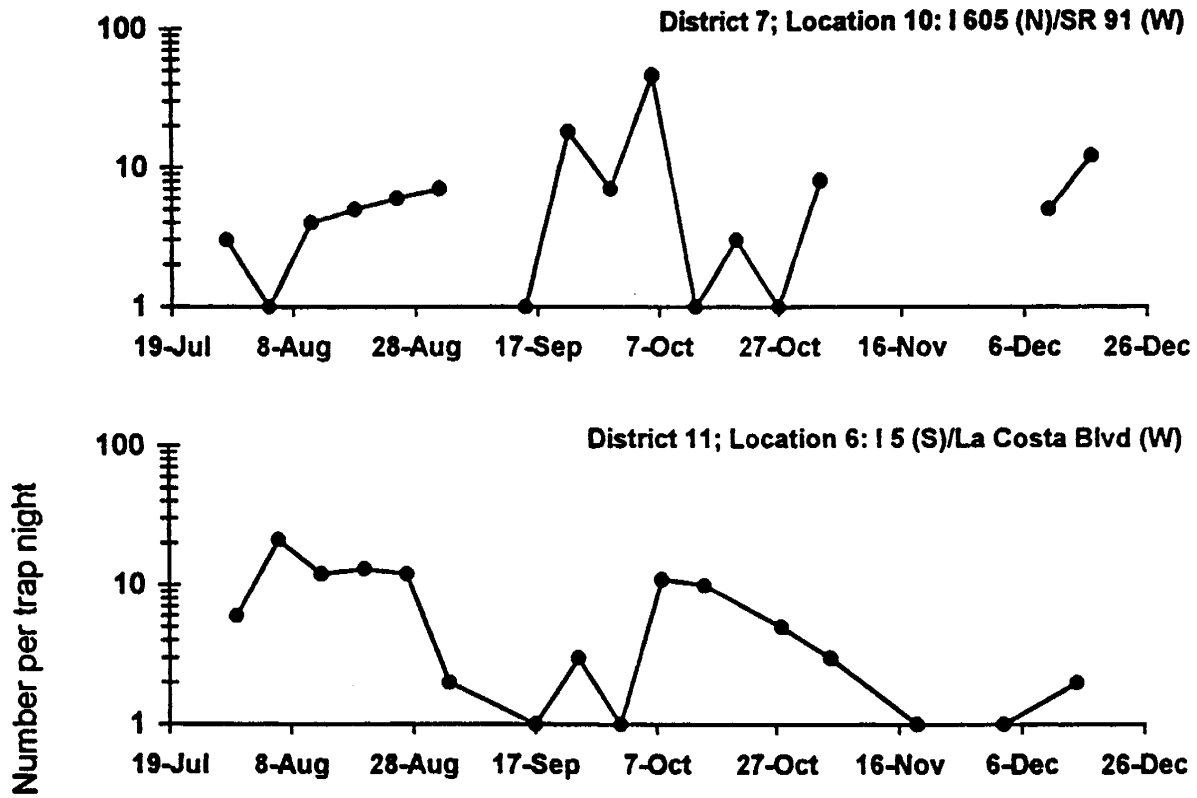
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



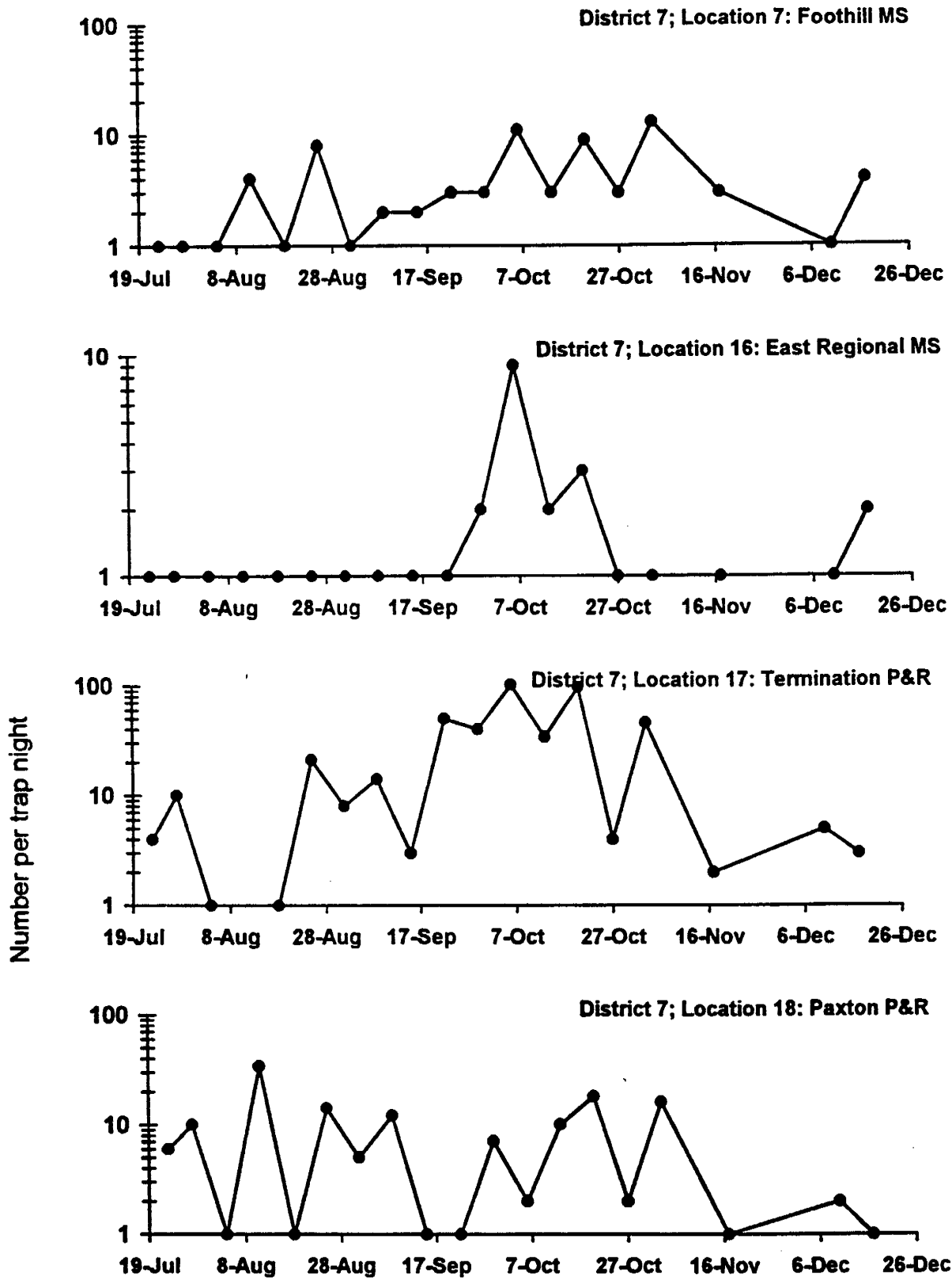
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Infiltration Basins



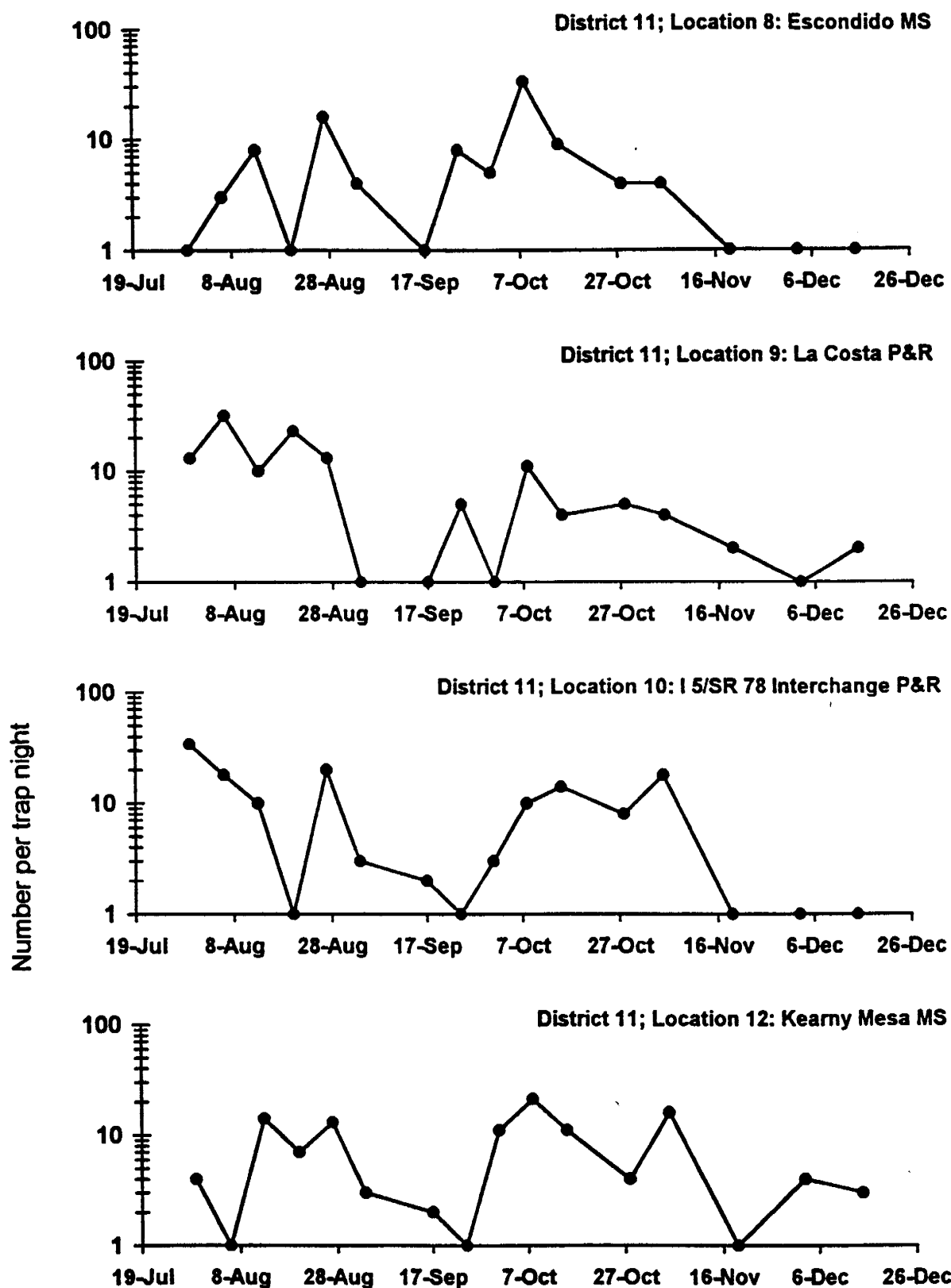
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Media Filters



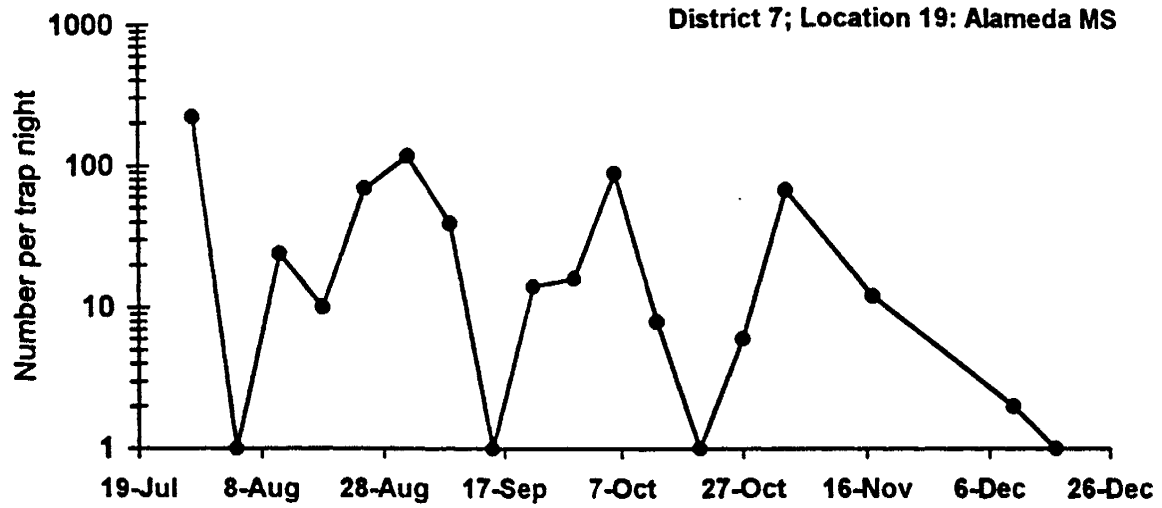
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Media Filters



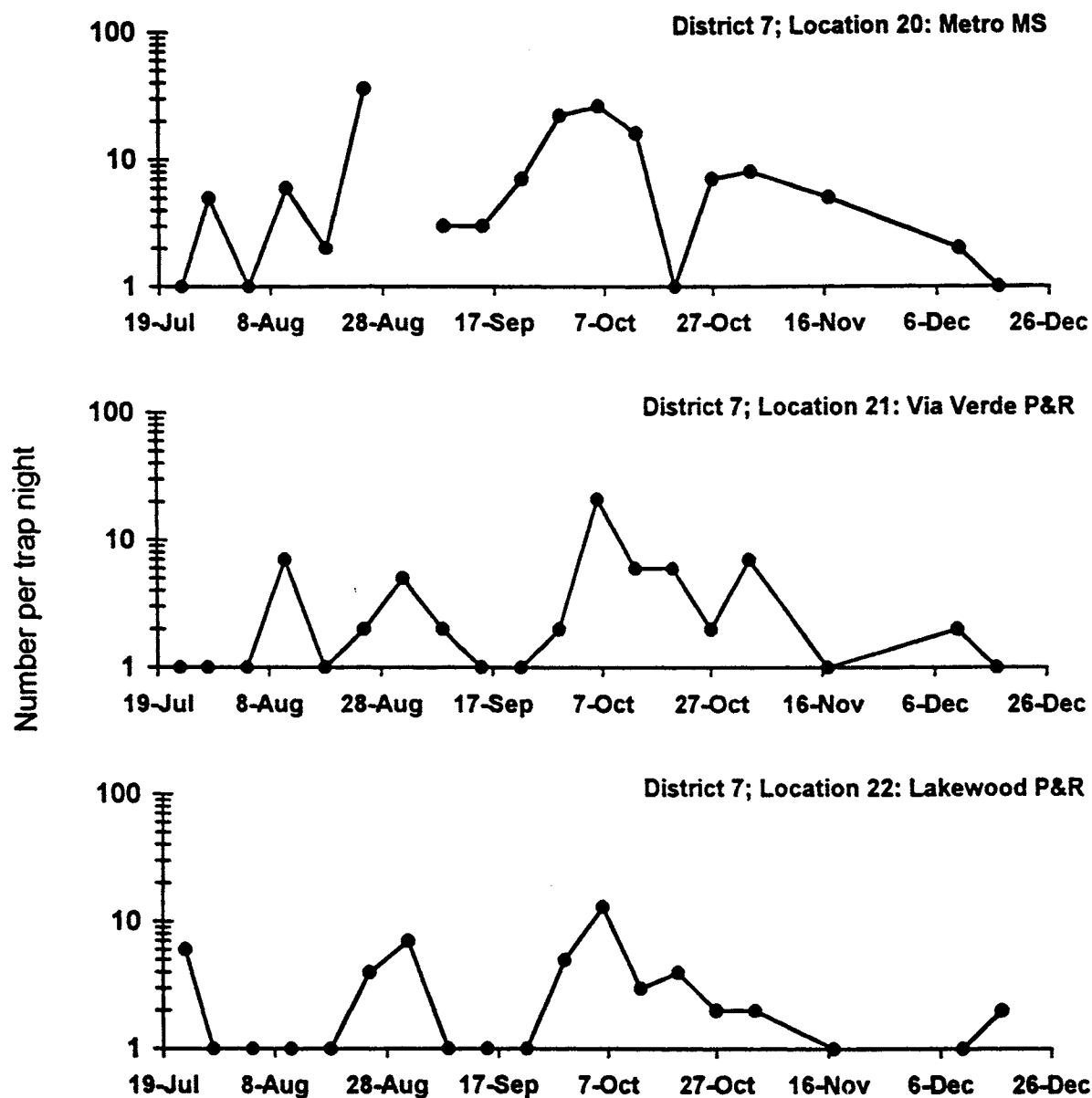
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Oil / Water Separator



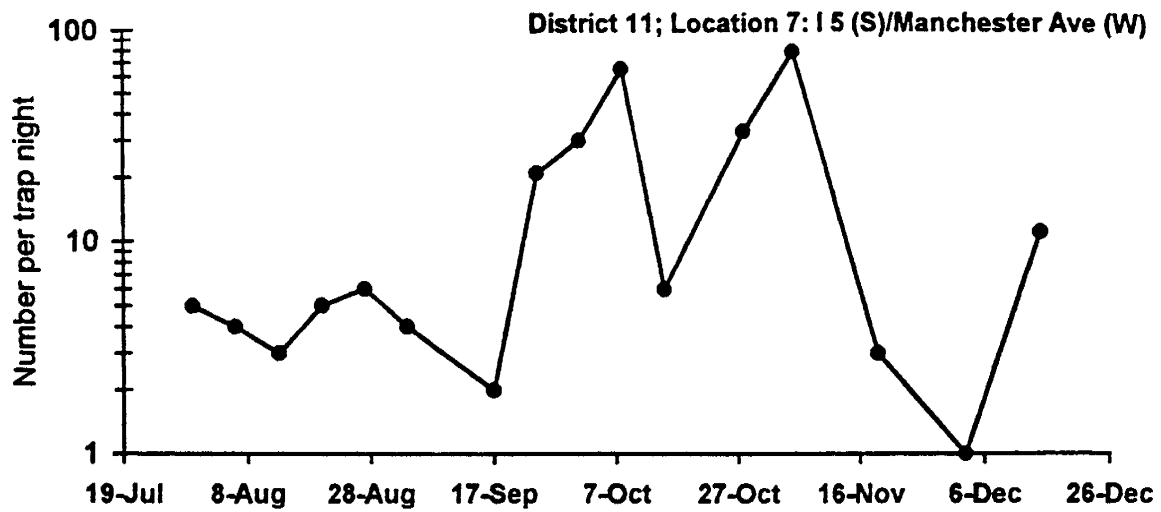
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

MCTTs



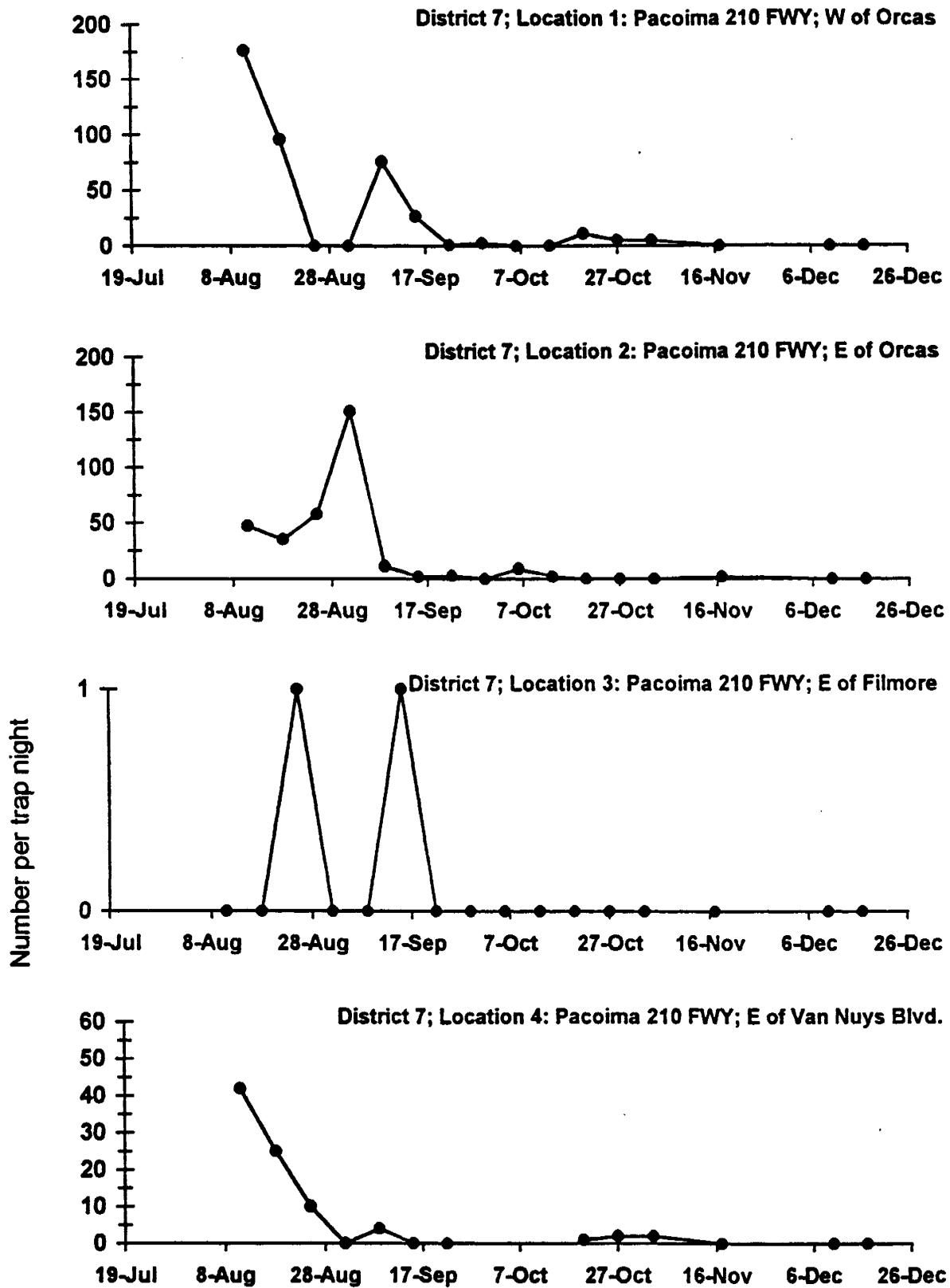
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Wet Basin



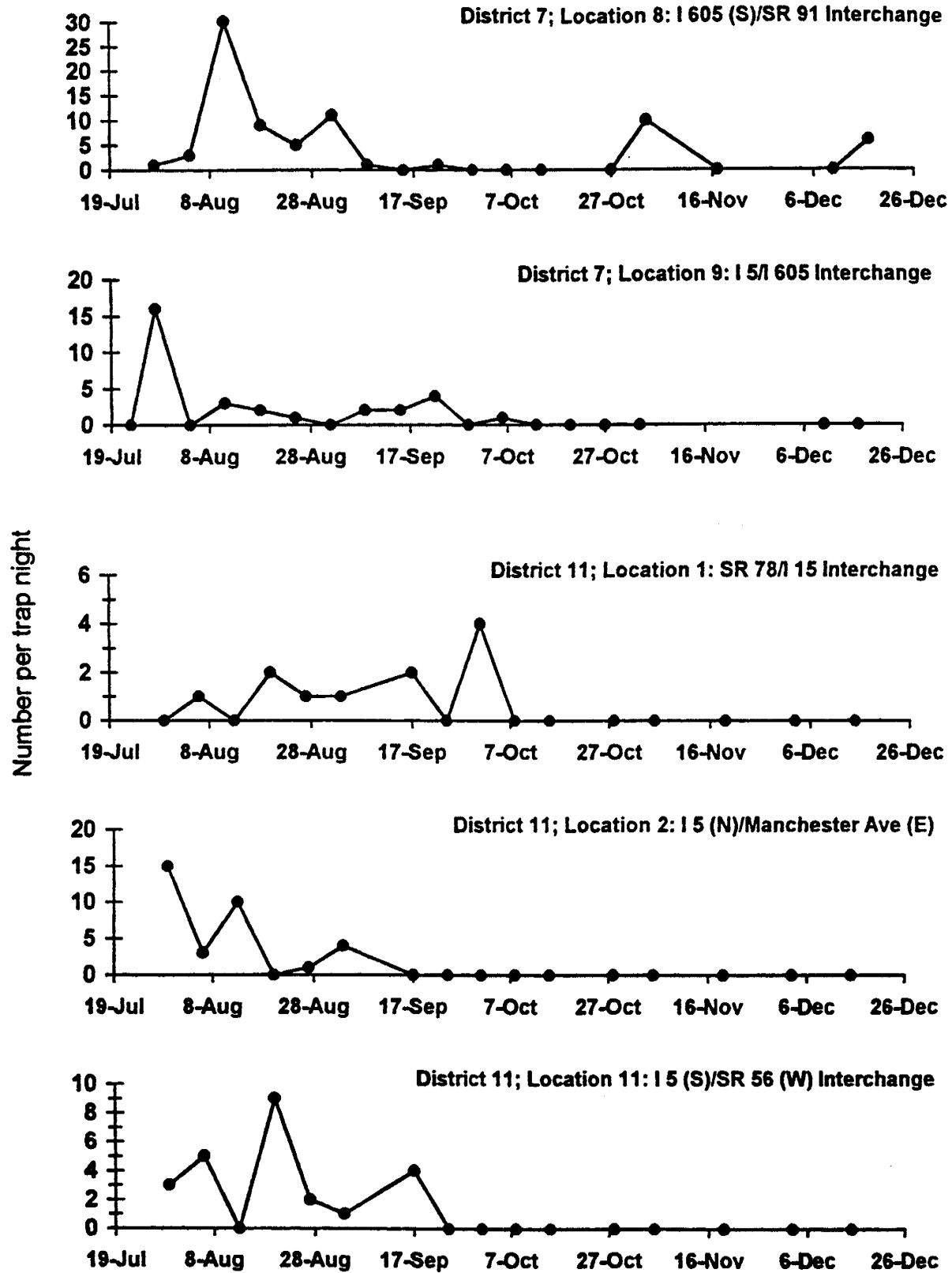
Appendix 1, Fig. 2 (continued). Abundance of host-seeking mosquitoes in gravid traps during the Vector Control Background Monitoring Study.

Trapping Catch Basins



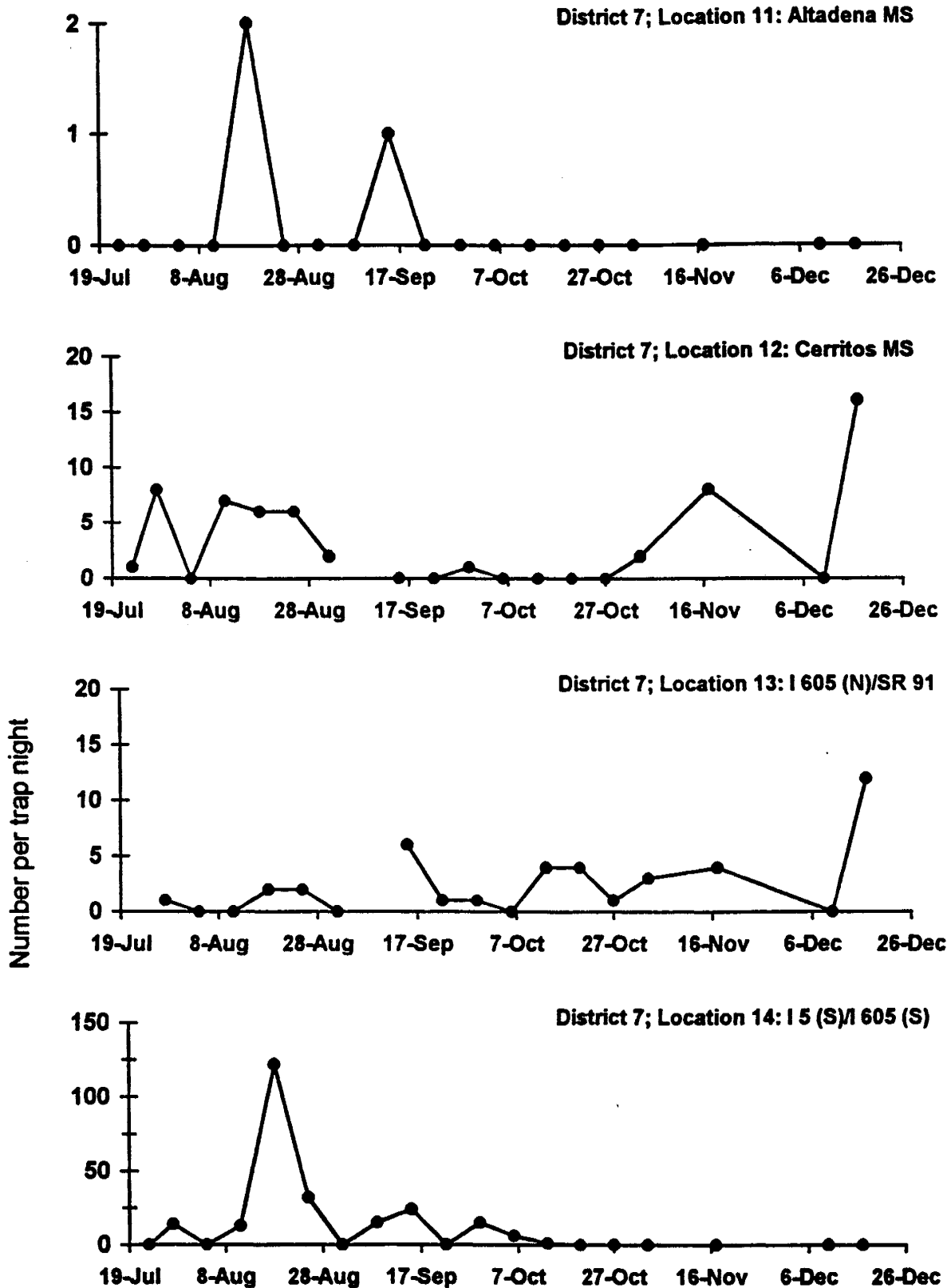
Appendix 1, Fig. 3. Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Extended Detention Basins



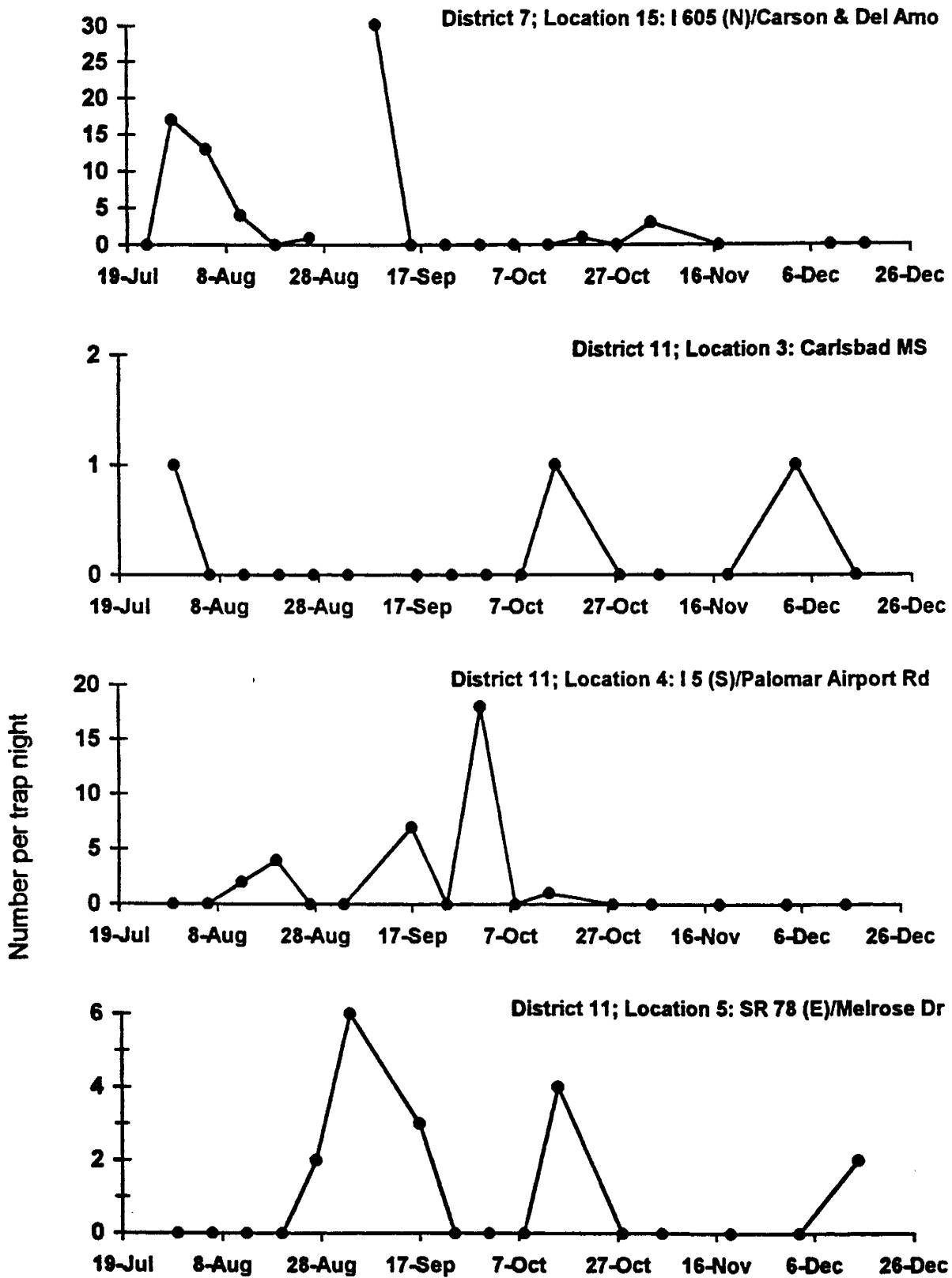
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



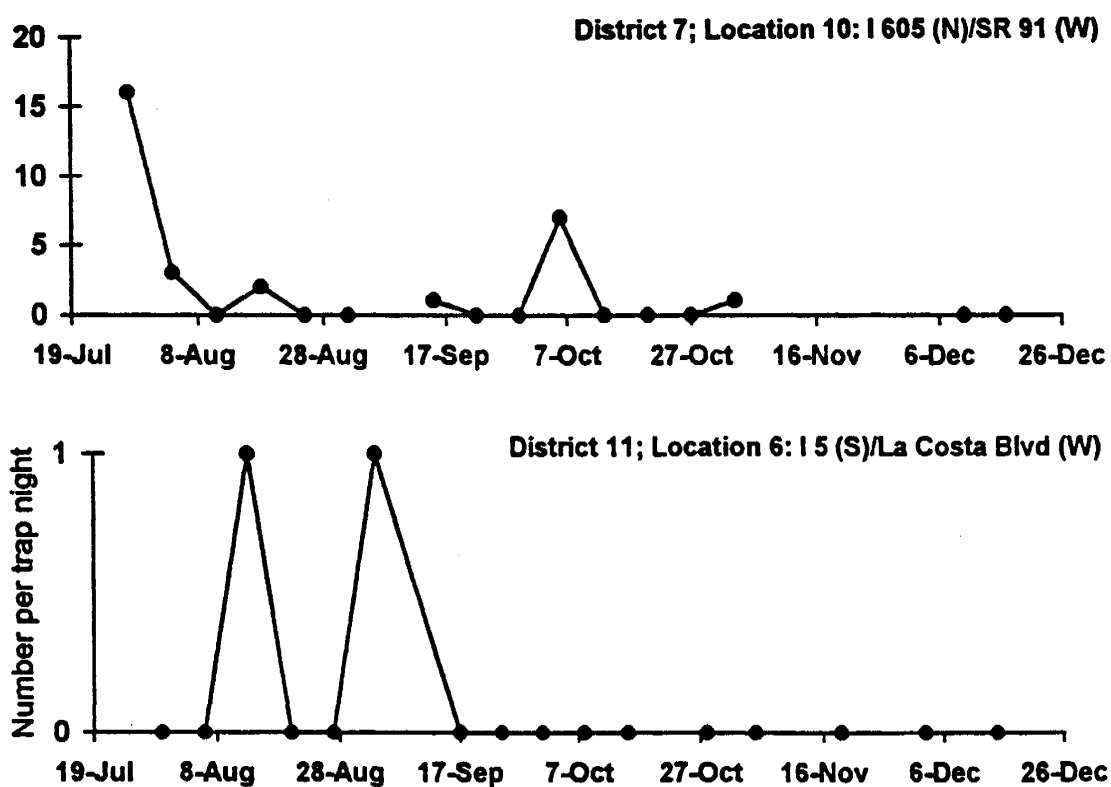
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Trench / Biofilter (Swale / Strip)



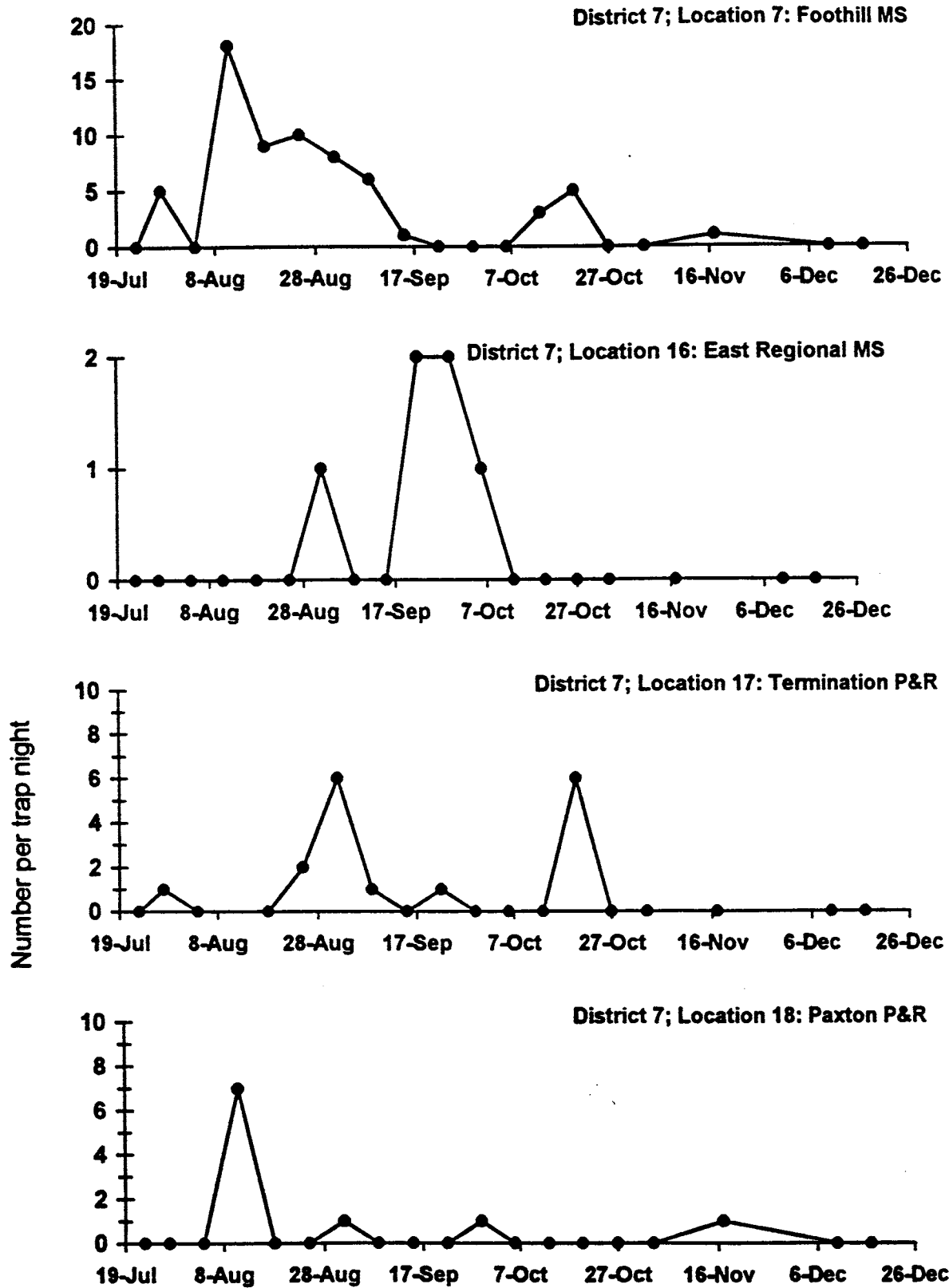
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Infiltration Basins



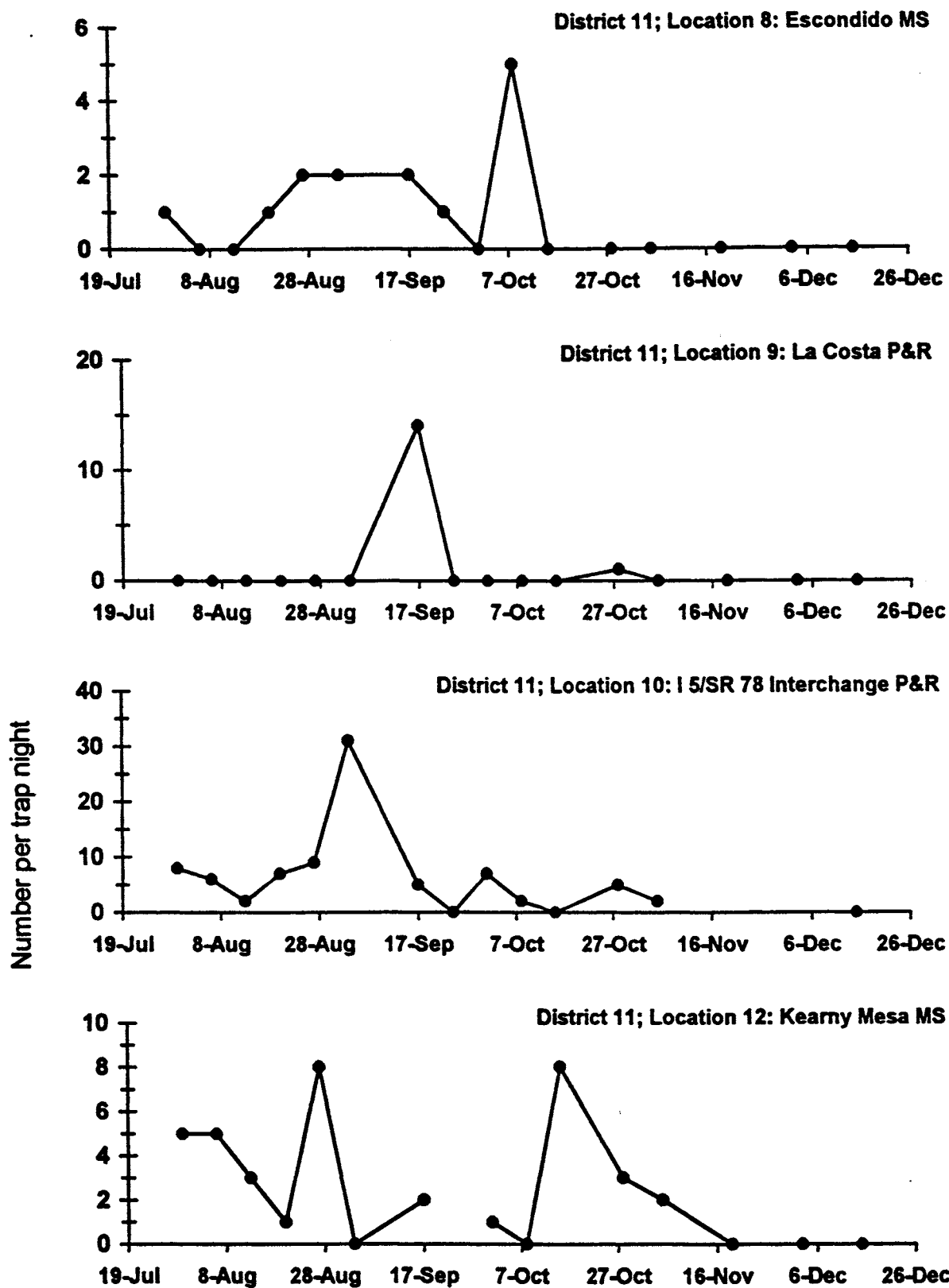
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Media Filters



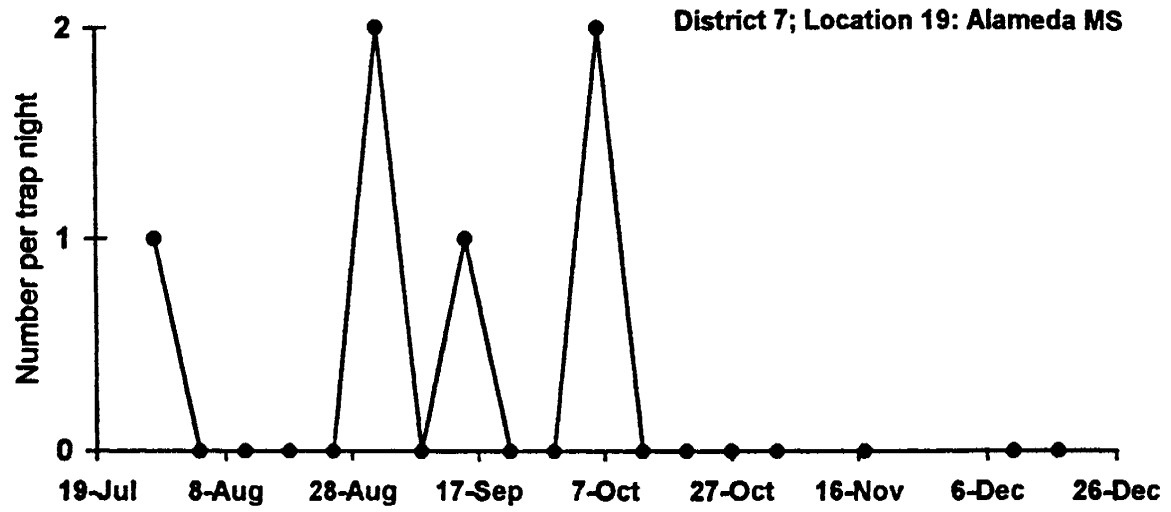
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Media Filters



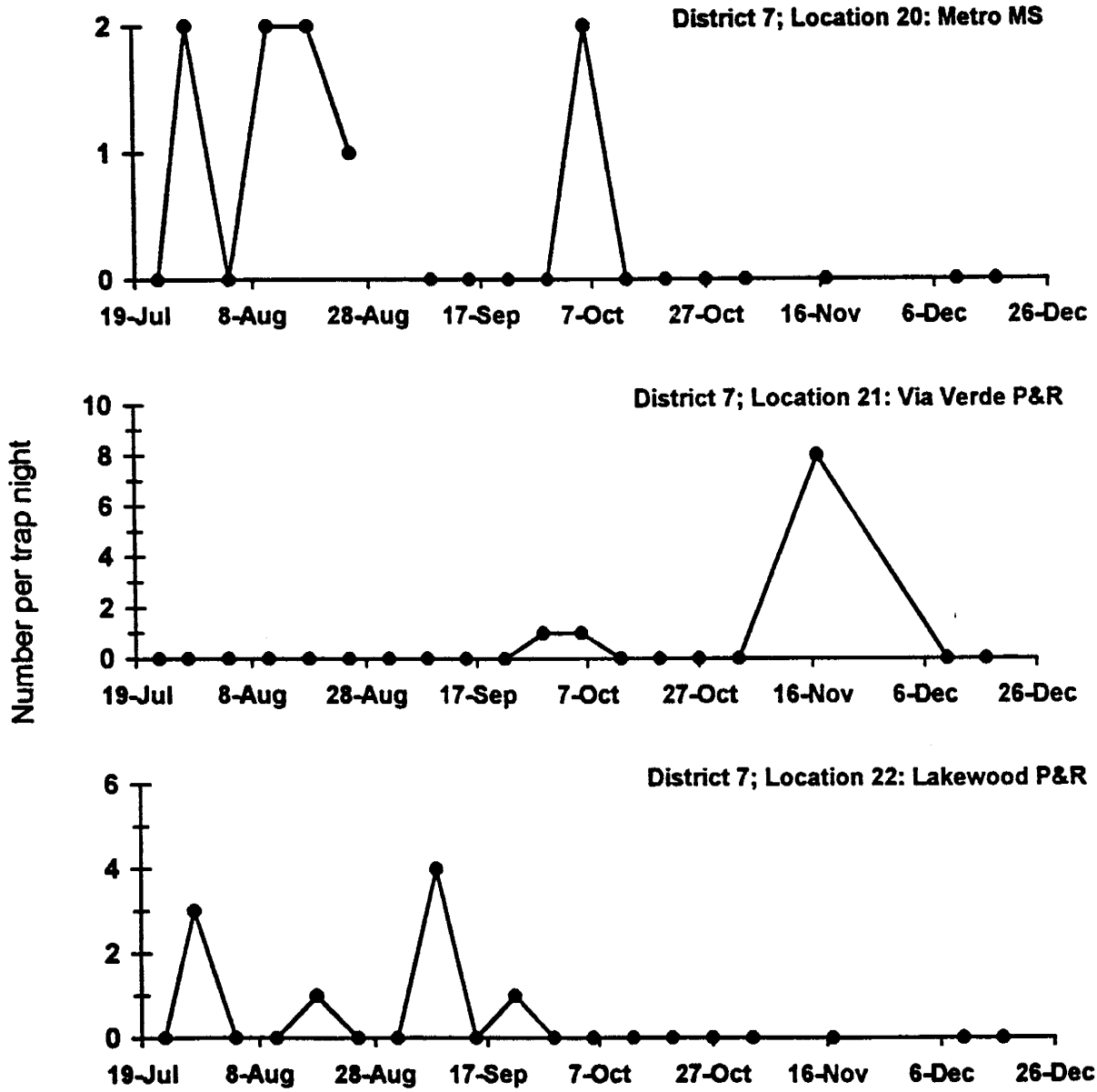
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Oil / Water Separator



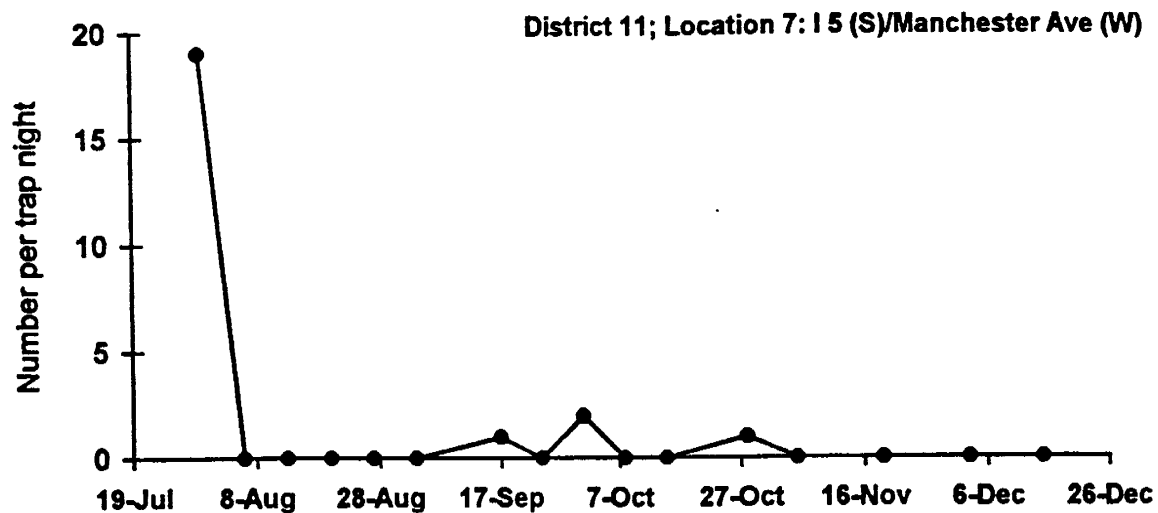
Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

M C T T's



Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

Wet Basin



Appendix 1, Fig. 3 (continued). Abundance of midges in carbon dioxide-baited light traps during the Vector Control Background Monitoring Study.

APPENDIX D

VECTOR CONTROL SERVICE AGREEMENTS

SERVICE AGREEMENT

To Provide Vector Control Service Associated with the California Department of Transportation's Best Management Practices Retrofit Pilot Program In District 7 (Los Angeles)

The Board of Trustees of the San Gabriel Valley Mosquito & Vector Control District (SGVMVCD) acknowledges the vector control activities requested by the California Department of Transportation's (Caltrans) authorized consultant to provide vector control service for the Best Management Practice (BMP) sites constructed as part of the BMP Retrofit Pilot Program. This includes two (2) BMP sites located within the boundaries of the SGVMVCD. The BMP sites include the Foothill Maintenance Station and the Rosemead Maintenance Station. Furthermore, SGVMVCD agrees to provide those services at the subject BMP locations for the period of February 15, 1999 to June 30, 2001 at a cost not to exceed \$25,000. At any time during this period, either party can request that the appropriateness of the "not to exceed" figure be examined and, if necessary, re-negotiated. Reasons for re-negotiation may include, but are not limited to, changes in the scope of work, unexpected increases or decreases in labor hours and unexpected increases or decreases in abatement costs.

The SGVMVCD shall bill Caltrans' authorized consultant at the following address:
Law/Crandall, 9177 Sky Park Court, Suite A, San Diego, California, 92123. Contact: Ed Othmer.

SGVMVCD also agrees to the following:

1. Excluding work efforts associated with adult mosquito sampling, SGMVVCD shall provide services in accordance with Attachment A, Vector Control Plan.
2. It is noted and understood that access to BMP sites located within Caltrans Maintenance Stations will be limited to operational hours as designated by each facility. The presence or absence of vectors shall be recorded by VCD.
3. If vector(s) are present, Caltrans' authorized consultant shall be informed within 24 HOURS. If immature stages of mosquitoes are present, black fly larvae exceed 10 within a three (3) square-foot area, or vertebrate vectors are present requiring control, the BMP site(s) shall immediately be treated with appropriate pesticides or, if feasible, biological control agents, or source reduction to destroy the vector(s) within 24 to 48 hours. SGVMVCD shall re-inspect the site within 48 hours and if determined necessary, continue abatement procedures.

4. SGVMVCD shall provide monthly status reports to Caltrans authorized consultant. The reports shall be submitted by the 10th of the month following the report month and shall contain data collected at each BMP site. In addition, each report, if applicable, shall contain method /of control, pesticides, if applied, including their applications rates and method of application, and labor hours for each inspection and/or treatment on a site by site basis.

District Manager

Consultant

Date

Date

SERVICE AGREEMENT

To Provide Vector Control Service Associated with the California Department of Transportation's Best Management Practices Retrofit Pilot Program In District 7 (Los Angeles)

The Board of Trustees of the Los Angeles County West Vector Control District (LACWVCD) acknowledges the vector control activities requested by the California Department of Transportation's (Caltrans) authorized consultant to provide vector control service for the Best Management Practice (BMP) sites constructed as part of the BMP Retrofit Pilot Program. This includes one (1) BMP site located within the boundaries of the LACWVCD. This BMP site is located at the Las Flores Maintenance Station. Furthermore, LACWVCD agrees to provide those services at the subject BMP locations for the period of February 15, 1999 to June 30, 2001 at a cost not to exceed \$15,000. At any time during this period, either party can request that the appropriateness of the "not to exceed" figure be examined and, if necessary, re-negotiated. Reasons for re-negotiation may include, but are not limited to, changes in the scope of work, unexpected increases or decreases in labor hours and unexpected increases or decreases in abatement costs.

The LACWVCD shall bill Caltrans' authorized consultant at the following address:
Law/Crandall, 9177 Sky Park Court, Suite A, San Diego, California, 92123. Contact: Ed Othmer.

LACWVCD also agrees to the following:

1. Excluding work efforts associated with adult mosquito sampling, LACWVCD shall provide services in accordance with Attachment A, Vector Control Plan.
2. It is noted and understood that access to BMP sites located within Caltrans Maintenance Stations will be limited to operational hours as designated by each facility. The presence or absence of vectors shall be recorded by VCD.
3. If vector(s) are present, Caltrans' authorized consultant shall be informed within 24 HOURS. If immature stages of mosquitoes are present, black fly larvae exceed 10 within a three (3) square-foot area, or vertebrate vectors are present requiring control, the BMP site(s) shall immediately be treated with appropriate pesticides or, if feasible, biological control agents, or source reduction to destroy the vector(s) within 24 to 48 hours. LACWVCD shall re-inspect the site within 48 hours and if determined necessary, continue abatement procedures.

3. LACWVCD shall provide monthly status reports to Caltrans authorized consultant. The reports shall be submitted by the 10th of the month following the report month and shall contain data collected at each BMP site. In addition, each report, if applicable, shall contain method /of control, pesticides, if applied, including their applications rates and method of application, and labor hours for each inspection and/or treatment.

District Manager

Consultant

Date

Date

SERVICE AGREEMENT

To Provide Vector Control Service Associated with the California Department of Transportation's Best Management Practices Retrofit Pilot Program In District 7 (Los Angeles)

The Board of Trustees of the Greater Los Angeles County Vector Control District (GLACVCD) acknowledges the vector control activities requested by the California Department of Transportation's (Caltrans) authorized consultant to provide vector control service for the Best Management Practice (BMP) sites constructed as part of the BMP Retrofit Pilot Program. This includes ten (10) BMP sites located within the boundaries of the GLACVCD. The BMP sites are as follows: I-210/West of Orcas Ave., I-210/East of Orcas Ave., I-210/East of Filmore St., I-210/East of Van Nuys Blvd., I-605/SR-91 (Infiltration Basin), Altadena Maintenance Station, I-605/SR-91 (Bio Strip/Swale), Cerritos Maintenance Station, I-5/I-605, and I-605/Del Amo Ave. Furthermore, GLACVCD agrees to provide those services at the subject BMP locations for the period of February 15, 1999 to June 30, 2001 at a cost not to exceed \$113,507. At any time during this period, either party can request that the appropriateness of the "not to exceed" figure be examined and, if necessary, re-negotiated. Reasons for re-negotiation may include, but are not limited to, changes in the scope of work, unexpected increases or decreases in labor hours and unexpected increases or decreases in abatement costs.

The GLACVCD shall bill Caltrans' authorized consultant at the following address:
Law/Crandall, 9177 Sky Park Court, Suite A, San Diego, California, 92123. Contact: Ed Othmer.

GLACVCD also agrees to the following:

1. Excluding work efforts associated with adult mosquito sampling, GLACVCD shall provide services in accordance with Attachment A, Vector Control Plan.
2. It is noted and understood that access to BMP sites located within Caltrans Maintenance Stations will be limited to operational hours as designated by each facility. The presence or absence of vectors shall be recorded by VCD.
3. If vector(s) are present, Caltrans' authorized consultant shall be informed within 24 HOURS. If immature stages of mosquitoes are present, black fly larvae exceed 10 within a three (3) square-foot area, or vertebrate vectors are present requiring control, the BMP site(s) shall immediately be treated with appropriate pesticides or, if feasible, biological control agents, or source reduction to destroy the vector(s) within 24 to 48 hours.

GLACVCD shall re-inspect the site within 48 hours and if determined necessary, continue abatement procedures.

4. GLACVCD shall provide monthly status reports to Caltrans authorized consultant. The reports shall be submitted by the 10th of the month following the report month and shall contain data collected at each BMP site. In addition, each report, if applicable, shall contain method /of control, pesticides, if applied, including their applications rates and method of application, and labor hours for each inspection and/or treatment on a site by site basis.

District Manager

Consultant

Date

Date

SERVICE AGREEMENT

To Provide Vector Control Service Associated with the California Department of Transportation's Best Management Practices Retrofit Pilot Program In District 7 (Los Angeles)

The Board of Trustees of the San Gabriel Valley Mosquito & Vector Control District (SGVMVCD) acknowledges the vector control activities requested by the California Department of Transportation's (Caltrans) authorized consultant to provide vector control service for the Best Management Practice (BMP) sites constructed as part of the BMP Retrofit Pilot Program. This includes two (2) BMP sites located within the boundaries of the SGVMVCD. The BMP sites include the Foothill Maintenance Station and Via Verde Park and Ride. Furthermore, SGVMVCD agrees to provide those services at the subject BMP locations for the period of February 15, 1999 to June 30, 2001 at a cost not to exceed \$25,000. At any time during this period, either party can request that the appropriateness of the "not to exceed" figure be examined and, if necessary, re-negotiated. Reasons for re-negotiation may include, but are not limited to, changes in the scope of work, unexpected increases or decreases in labor hours and unexpected increases or decreases in abatement costs.

The SGVMVCD shall bill Caltrans' authorized consultant at the following address: Brown and Caldwell, 9040 Friars Road, Suite 220, San Diego, California, 92108-1601. Contact: Mark Williams.

SGVMVCD also agrees to the following:

1. Excluding work efforts associated with adult mosquito sampling, SGMVVCD shall provide services in accordance with Attachment A, Vector Control Plan.
2. It is noted and understood that access to BMP sites located within Caltrans Maintenance Stations will be limited to operational hours as designated by each facility. The presence or absence of vectors shall be recorded by VCD.
3. If vector(s) are present, Caltrans' authorized consultant shall be informed within 24 HOURS. If immature stages of mosquitoes are present, black fly larvae exceed 10 within a three (3) square-foot area, or vertebrate vectors are present requiring control, the BMP site(s) shall immediately be treated with appropriate pesticides or, if feasible, biological control agents, or source reduction to destroy the vector(s) within 24 to 48 hours.

SGVMVCD shall re-inspect the site within 48 hours and if determined necessary, continue abatement procedures.

4. SGVMVCD shall provide monthly status reports to Caltrans authorized consultant. The reports shall be submitted by the 10th of the month following the report month and shall contain data collected at each BMP site. In addition, each report, if applicable, shall contain method /of control, pesticides, if applied, including their applications rates and method of application, and labor hours for each inspection and/or treatment on a site by site basis.

District Manager

Consultant

Date

Date

SERVICE AGREEMENT

To Provide Vector Control Service Associated with the California Department of Transportation's Best Management Practices Retrofit Pilot Program In District 7 (Los Angeles)

The Board of Trustees of the Greater Los Angeles County Vector Control District (GLACVCD) acknowledges the vector control activities requested by the California Department of Transportation's (Caltrans) authorized consultant to provide vector control service for the Best Management Practice (BMP) sites constructed as part of the BMP Retrofit Pilot Program. This includes eight (8) BMP sites located within the boundaries of the GLACVCD. The BMP sites are as follows: I-5/I-605, I-605/SR-91, Alameda Maintenance Station, Eastern Regional Maintenance Station, Termination Park and Ride, Paxton Park and Ride, Metro Maintenance Station, and Lakewood Park and Ride. Furthermore, GLACVCD agrees to provide those services at the subject BMP locations for the period of February 15, 1999 to June 30, 2001 at a cost not to exceed \$90,805. At any time during this period, either party can request that the appropriateness of the "not to exceed" figure be examined and, if necessary, re-negotiated. Reasons for re-negotiation may include, but are not limited to, changes in the scope of work, unexpected increases or decreases in labor hours and unexpected increases or decreases in abatement costs.

The GLACVCD shall bill Caltrans' authorized consultant at the following address: Brown and Caldwell, 9040 Friars Road, Suite 220, San Diego, California, 92108-1601. Contact: Mark Williams.

GLACVCD also agrees to the following:

1. Excluding work efforts associated with adult mosquito sampling, GLACVCD shall provide services in accordance with Attachment A, Vector Control Plan.
2. It is noted and understood that access to BMP sites located within Caltrans Maintenance Stations will be limited to operational hours as designated by each facility. The presence or absence of vectors shall be recorded by VCD.
3. If vector(s) are present, Caltrans' authorized consultant shall be informed within 24 HOURS. If immature stages of mosquitoes are present, black fly larvae exceed 10 within a three (3) square-foot area, or vertebrate vectors are present requiring control, the BMP site(s) shall immediately be treated with appropriate pesticides or, if feasible, biological

control agents, or source reduction to destroy the vector(s) within 24 to 48 hours. GLACVCD shall re-inspect the site within 48 hours and if determined necessary, continue abatement procedures.

4. GLACVCD shall provide monthly status reports to Caltrans authorized consultant. The reports shall be submitted by the 10th of the month following the report month and shall contain data collected at each BMP site. In addition, each report, if applicable, shall contain method /of control, pesticides, if applied, including their applications rates and method of application, and labor hours for each inspection and/or treatment on a site by site basis.

District Manager

Consultant

Date

Date

AGREEMENT WITH THE CALIFORNIA DEPARTMENT OF TRANSPORTATION,
THROUGH KINNETIC LABORATORIES, REGARDING VECTOR CONTROL
SERVICES ASSOCIATED WITH THE BEST MANAGEMENT PRACTICES RETROFIT
PILOT PROJECT SITES

THIS AGREEMENT, made this 17th day of March, 1999 between the County of San Diego, hereinafter called "County" and the CALIFORNIA DEPARTMENT OF TRANSPORTATION, hereinafter called "Caltrans", through Kinnetics Laboratories, for and on behalf of Caltrans.

WITNESSETH:

WHEREAS, Caltrans entered into Consent Decree to develop a Best Management Practice (BMP) Retrofit Pilot Program (hereinafter, Program) for treating runoff to remove constituents of concern in highway storm water runoff from Caltrans highways and facilities within urbanized areas of Caltrans District 11, located in the County of San Diego; and

WHEREAS, Caltrans objectives are to monitor, determine and evaluate the feasibility of design, construction, operation, performance, maintenance, and safety of selected Program projects, and to allow observations pertaining to cost of retrofitting, and benefits of the various Program projects; and

WHEREAS, the proposed Program projects include extended detention basins, infiltration basins, biofiltration strips/swales, a wet basin, infiltration trenches, biofilters, and media filter, any of which may present potential vector occurrence and control issues; and

WHEREAS, the County of San Diego Department of Environmental Health (DEH) is charged with the responsibility to protect the public health, safety and welfare by controlling vectors; and

WHEREAS, it is anticipated that a number of the Program projects will be constructed and operational beginning December 1998, and the remaining projects will be constructed by June 30, 1999, and will be active for a minimum of two (2) years; and

WHEREAS, it is in the public's interest to maximize governmental cooperation and efficiency, to protect the environment and the public health by enabling the Program to proceed on schedule in accordance with guidelines established in the Operation, Maintenance and Monitoring (OM&M) Plan to remove constituents of concern from storm water runoff while preventing and controlling vectors; NOW THEREFORE,

IT IS AGREED:

1. Caltrans, as the authorizing agency for the Program, shall assume responsibility for the design, construction, operation, maintenance and performance of the program, and for the occurrence and abundance of any vectors emanating from the Program project sites.
2. Caltrans, through its consultants and subcontractors, shall operate and maintain on a routine basis the Program project sites in accordance with the OM&M Plan guidelines.
3. The County of San Diego shall, through the DEH, perform vector surveillance and control activities in accordance with the OM&M Plan and Appendices, specifically Appendix IV, *Vector Control Plan*. The DEH shall provide such personnel, facilities and services necessary to perform vector surveillance and control services and activities.
4. The County authorizes the Director, DEH to execute the terms of this Agreement, and any future amendments to this Agreement, for the County, which do not materially change the Agreement. For purposes of this Agreement, a material change shall be defined as: a) any change that will no longer assure full cost recovery for services and activities provided, or b) amendments which substantially alter the intended services and activities. Material change shall require approval by the County Board of Supervisors prior to execution.
5. Caltrans, through Kinnetic Laboratories, shall pay to the County for all costs based on an agreed upon Fee Schedule. Caltrans agrees to pay the County a total sum not to exceed \$165,000 for vector surveillance and control services and activities performed during the three-year fiscal period beginning December 1, 1998 to June 30, 2001.
6. If compensation as set forth in Item 5 of this Agreement is projected to be insufficient to pay for services and activities provided by the County, the County agrees to continue to provide the agreed to services and activities, and Caltrans, through Kinnetic Laboratories, agrees to compensate the County for said services and activities in accordance with the terms of this Agreement until an amended Agreement is executed.
7. The DEH shall bill Kinnetic Laboratories, for and on behalf of Caltrans on a quarterly basis for all actual costs incurred by the DEH for the performance of vector surveillance and control as discussed in Item 5.
8. Caltrans, or its consultants and subcontractors, shall inform the DEH and the California Department of Health Services (CDHS), in writing, of any required significant revisions to the Program and/or OM&M Plan and/or any project site,

which may, in any manner, affect the vector breeding/attracting potential and the conduct of vector surveillance and control.

9. Caltrans, or its consultants and subcontractors, shall consult and coordinate with the DEH and the CDHS to receive comments and recommendations regarding the design, construction, operation and maintenance of Program project sites as they relate to vector surveillance and control. Where reasonable and practical Caltrans, or its consultants and subcontractors, shall adopt and implement such comments and recommendations to prevent and control vectors.
10. Caltrans, or its consultants and subcontractors, and the DEH concur that under separate agreement between Caltrans and the CDHS, the CDHS will provide vector related technical expertise and consultation assistance to Caltrans, their consultants, and participating local vector control agencies. Caltrans, or its consultants and subcontractors, and the DEH also concur that the CDHS will be responsible for overall coordination of vector monitoring efforts, data collection, database management, data analysis efforts, assessment of efficacy of any abatement treatment, and dissemination of information relating to vector monitoring and control to participating agencies and involved parties on a regular basis.
11. Except for administrative services, all vector surveillance and control services and activities provided by the DEH at any Program project site shall be performed by employees who are fully certified by the CDHS in mosquito control, vertebrate vector control and terrestrial invertebrate vector control, and who shall obtain continuing education as required to maintain fully certified status.
12. Caltrans employees, consultants, contractors, subcontractors and other persons identified by Caltrans as responsible for the operation and maintenance of the Program project sites are authorized to communicate and coordinate with the DEH on behalf of Caltrans and receive data collected by the DEH. Caltrans, or its consultants and subcontractors, shall identify and provide to the DEH the names and addresses of such employees, consultants, contractors, subcontractors, or other persons for the purpose of communication, coordination and exchange of information and documentation relating to vector surveillance and control.
13. Caltrans, or its consultants and subcontractors, shall provide to the DEH access to each the Program project site within Caltrans District 11 to inspect for and control breeding of vectors. Access shall be limited to the hours between 6:00 AM to 6:00 PM, Monday through Friday, unless in the interest of the public health, safety and well being vector abatement is necessary during other unspecified hours.
14. Whenever the DEH finds vector breeding at any the Program project site, the DEH shall record the type of vector, its occurrence, stages of development, an

estimate of abundance, and the condition conducive to vector breeding. The DEH shall collect, identify as to species, catalogue and retain the vector specimen(s) as prima facie evidence that the site is a breeding place for vectors. Determination that a breeding place exists shall be made in accordance with the California Health and Safety Code, Section 2200, et al.

15. Whenever the DEH finds in any the Program project site mosquito breeding in any stage and in any amount, or black fly larvae in excess of 10 within a 3 square-foot area, or midge larvae in excess of 300 per square-foot of sampled substrate; or pupae of any aquatic vector in any amount; or evidence of presence of vertebrate vectors, the DEH shall control the vector breeding within 48 hours in a manner the DEH deems most appropriate. Control measures may include source reduction, biological control and/or pesticides. The DEH shall reinspect the site within 48 hours to determine effectiveness of the control effort and if additional or continued control measures are necessary.
16. The DEH shall provide monthly status reports to Caltrans, or its consultants and subcontractors, and the CDHS. The reports shall be submitted by the 10th of the month following the report month and shall contain information cited in items 12 and 13 of this Agreement. In addition the reports shall contain method of control, pesticides, if applied, including applications rates, methods of application, and labor hours for each inspection and/or treatment. Caltrans, or its consultants and subcontractors, and the CDHS shall provide to the DEH written comments, if any, on the reports within 30 days of receipt.
17. Notwithstanding new information or significant changes to the Program, environmental conditions, or laws and regulations relating to the Program or vector surveillance and control, Caltrans, or its consultants, contractors and subcontractors, and the DEH concur with Program procedures. Caltrans and the DEH agree to provide in writing explanation for any non-concurrence, and to seek dispute resolution. Disputes between Caltrans, or its consultants, contractors and subcontractors, and the DEH shall be expeditiously resolved. Disputes may include, but are not limited to, unresolved written non-concurrence, lack of response within agreed-upon time limits, and substantive departure from the terms of this Agreement. Disputes resolution may be initiated either by the DEH or Caltrans, or its consultants, contractors and subcontractors,. Efforts shall be made to resolve disputes first at an informal level, involving agency staff and mid-level management coordination. If Caltrans, or its consultants, contractors and subcontractors, and the DEH agree that the informal dispute resolution process has been exhausted, formal dispute resolution may be initiated. Either the DEH or Caltrans, or its consultants, contractors and subcontractors, may initiate in writing a formal dispute resolution meeting, to be held in no more than 45 days, stating the issue(s) and providing supporting background documentation. In the event that no resolution can be obtained, and vector(s) are not abated by Caltrans, or its consultants, contractors and subcontractors,

the DEH shall proceed with abatement procedures pursuant to California Health and Safety Code, Section 2200 et seq.

18. If Caltrans, or its consultants, contractors and subcontractors, abandons a site, fails to communicate with the DEH, fails to comply with any provisions of this Agreement, or fails to follow the guidelines as outlined in the OM&M Plan, any activity within these facilities would be subject to the laws/regulations of the County with the charge of implementing such laws and regulations.
19. That the term of this Agreement shall commence on March 17, 1999 and continue through June 30, 2001, and may be extended with the agreement of both parties, through June 30, 2004.
20. This Agreement is the entire understanding of the parties, and there are no other terms or conditions, written or oral, controlling this matter.
21. The COUNTY is an independent contractor and no agency relationship, either express or implied, is created by the execution of this Agreement.
22. Either the COUNTY or Caltrans, or its consultants, contractors and subcontractors, may terminate this agreement with ninety (90) days advance written notice given by the Authorized representative or his or her designee.
23. This Agreement shall continue beyond the final date of the term as set forth, pending renewal of the Agreement, provided that either Authorized representative has notified the other Authorized representative of an intention to renew the Agreement and neither party has terminated the agreement.

COUNTY OF SAN DIEGO

By _____ Date

CALIFORNIA DEPARTMENT OF TRANSPORTATION

By _____ Date

KINETIC LABORATORIES, FOR AND ON BEHALF OF
CALIFORNIA DEPARTMENT OF TRANSPORTATION

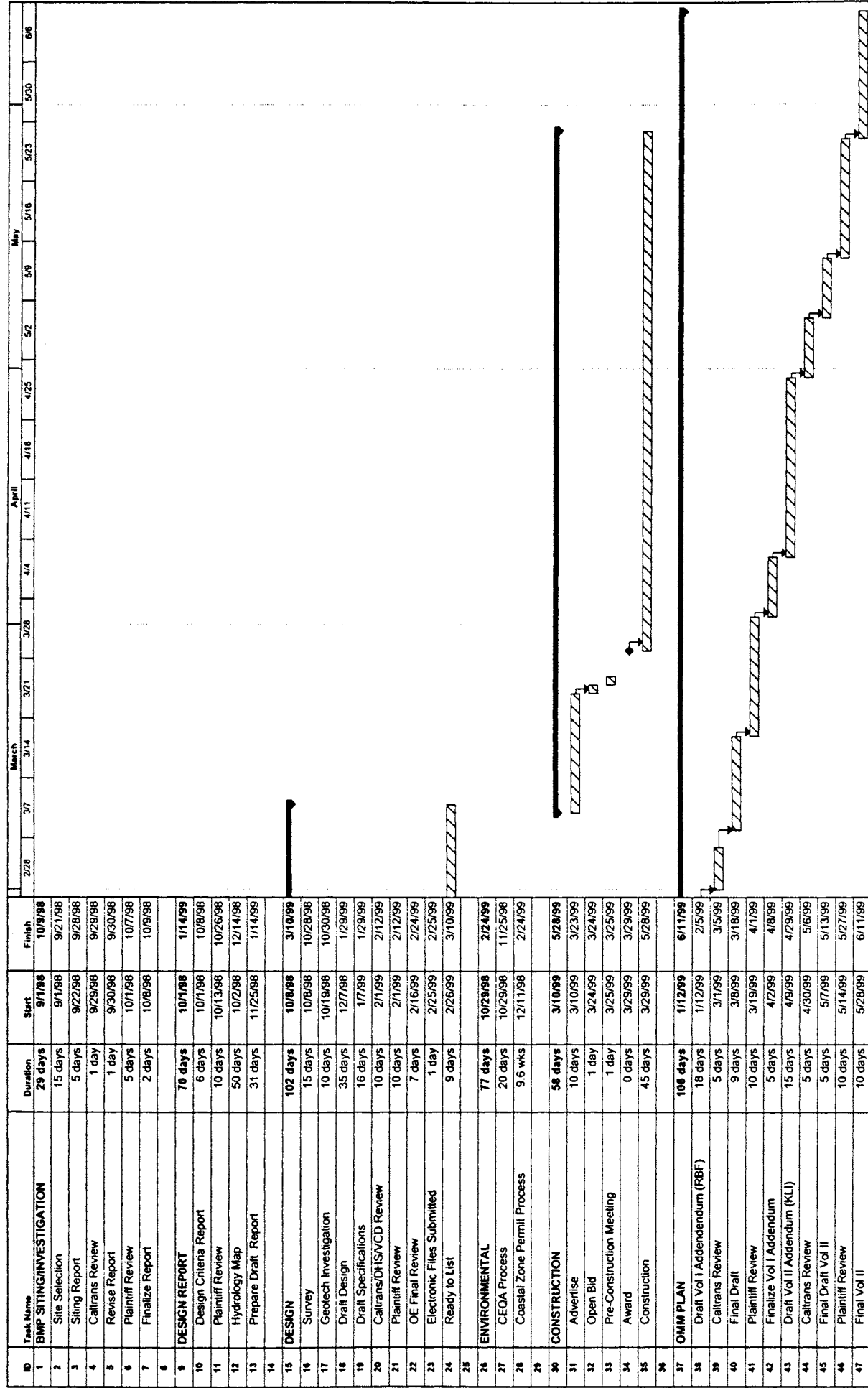
By _____ Date

APPENDIX E

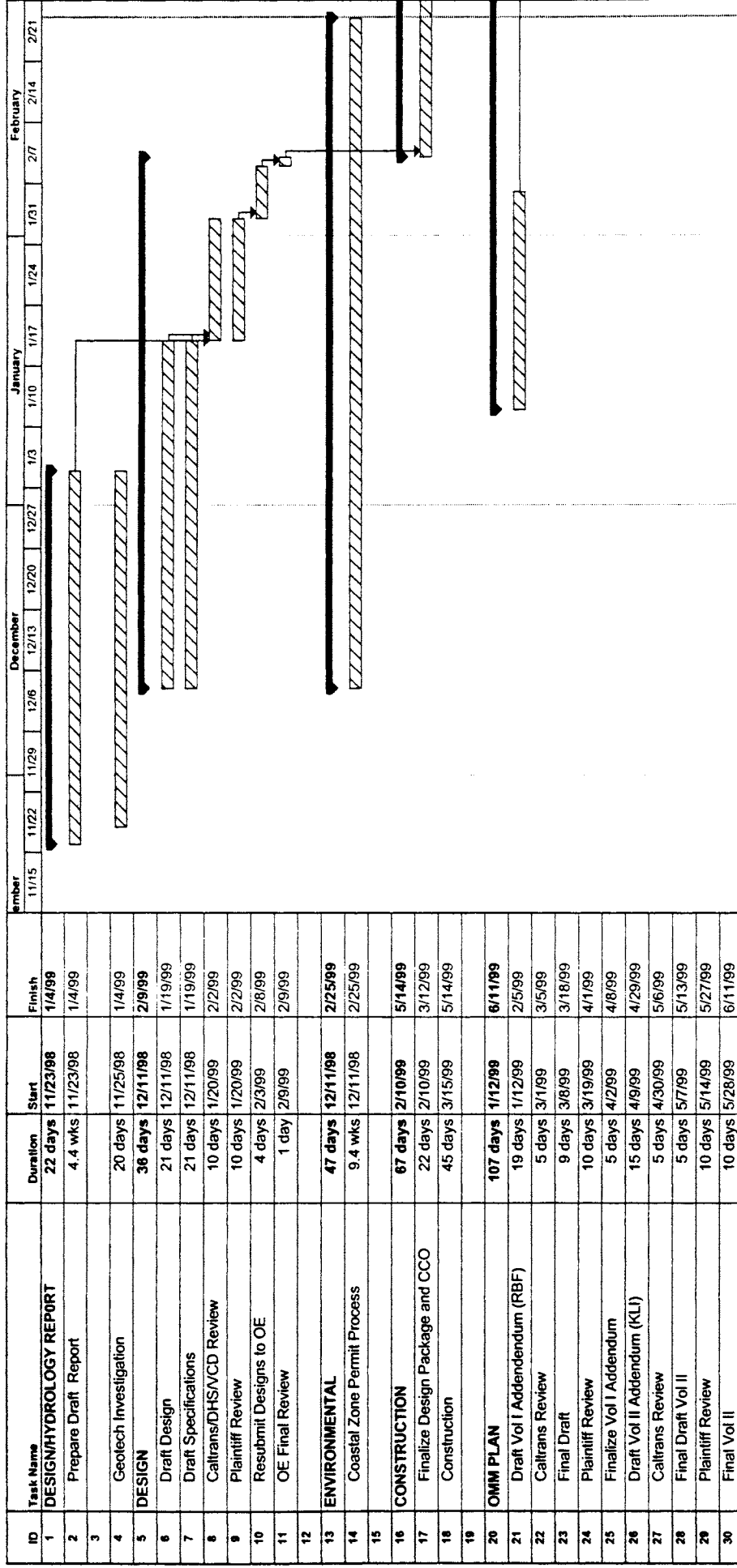
D11 WETPOND SITE, EDB SITE SCHEDULES

ID	Task Name	Duration	Start	Finish
1	BMP SITING/INVESTIGATION	29 days	9/1/98	10/9/98
2	Site Selection	15 days	9/1/98	9/21/98
3	Siting Report	5 days	9/22/98	9/28/98
4	Caltrans Review	1 day	9/29/98	9/29/98
5	Revise Report	1 day	9/30/98	9/30/98
6	Plaintiff Review	5 days	10/1/98	10/7/98
7	Finalize Report	2 days	10/8/98	10/9/98
8	DESIGN REPORT	70 days	10/1/98	1/14/99
9	Design Criteria Report	6 days	10/1/98	10/8/98
11	Plaintiff Review	10 days	10/13/98	10/26/98
12	Hydrology Map	50 days	10/2/98	12/14/98
13	Prepare Draft Report	31 days	11/25/98	1/14/99
14	DESIGN	102 days	10/8/98	3/10/99
16	Survey	15 days	10/8/98	10/28/98
17	Geotech Investigation	10 days	10/19/98	10/30/98
18	Draft Design	35 days	12/7/98	1/29/99
19	Draft Specifications	16 days	1/7/99	1/29/99
20	Caltrans/DHS/VCD Review	10 days	2/1/99	2/12/99
21	Plaintiff Review	10 days	2/1/99	2/12/99
22	OE Final Review	7 days	2/16/99	2/24/99
23	Electronic Files Submitted	1 day	2/25/99	2/25/99
24	Ready to List	9 days	2/26/99	3/10/99
25	ENVIRONMENTAL	77 days	10/29/98	2/24/99
26	CEQA Process	20 days	10/29/98	11/25/98
27	Coastal Zone Permit Process	9.6 wks	12/11/98	2/24/99
28	CONSTRUCTION	58 days	3/10/99	5/28/99
29	Advertise	10 days	3/10/99	3/23/99
30	Open Bid	1 day	3/24/99	3/24/99
31	Pre-Construction Meeting	1 day	3/25/99	3/25/99
32	Award	0 days	3/29/99	3/29/99
33	Construction	45 days	3/29/99	5/28/99
34	OMM PLAN	108 days	1/12/99	6/11/99
35	Draft Vol I Addendum (RBF)	18 days	1/12/99	2/5/99
36	Caltrans Review	5 days	3/1/99	3/5/99
37	Final Draft	9 days	3/8/99	3/18/99
38	Plaintiff Review	10 days	3/19/99	4/1/99
39	Finalize Vol I Addendum	5 days	4/2/99	4/8/99
40	Draft Vol II Addendum (KLI)	15 days	4/9/99	4/29/99
41	Caltrans Review	5 days	4/30/99	5/6/99
42	Final Draft Vol II	5 days	5/7/99	5/13/99
43	Plaintiff Review	10 days	5/14/99	5/27/99
44	Final Vol II	10 days	5/28/99	6/11/99

**CALTRANS BMP RETROFIT PILOT PROGRAM
CALTRANS DISTRICT 11
WB PS&E IMPLEMENTATION SCHEDULE**



**CALTRANS BMP RETROFIT PILOT PROGRAM
CALTRANS DISTRICT 11
EDB PS&E IMPLEMENTATION SCHEDULE**



**CALTRANS BMP RETROFIT PILOT PROGRAM
CALTRANS DISTRICT 11
EDB PS&E IMPLEMENTATION SCHEDULE**

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APPENDIX F
PROJECT CALENDAR

February 1999

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	1 Bi Weekly Report Due	2 Manchester EDB Design Plaintiff Comments Due to Caltrans	3 10:00 AM-Bi Weekly Conference Call--Marcel Peinado, Bob Wu, Rich Horner, Chris May, Rich Graff, RBF, Jeremy Johnstone.	4	5	6																																																																																											
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February

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- 18** D7 BMP Site Visit-Attendees: C. May, B. Wu, R. Graff, D. Neiter, B. Wittenberg

March 1999

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April 1999

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April

12

Bi Weekly Report Due

14

10:00 AM-Bi Weekly Conference Call--Marcel Peinado, Bob Wu, Rich Horner, Chris May, Rich Graft, RBF, Jeremy Johnstone.

26

Wet Basin/EDB OMM Vol II Due to Plaintiffs

Bi Weekly Report Due

28

10:00 AM-Bi Weekly Conference Call--Marcel Peinado, Bob Wu, Rich Horner, Chris May, Rich Graft, RBF, Jeremy Johnstone.

May 1999

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday																																																																																				
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- 7** Wet Bason/EDB Vol II Plaintiff Comments Due to Caltrans
- 10** Bi Weekly Report Due
- 12** 10:00 AM-Bi Weekly Conference Call--Marcel Peinado, Bob Wu, Rich Horner, Chris May, Rich Graff, RBF, Jeremy Johnstone.
- 24** Bi Weekly Report Due
- 26** 10:00 AM-Bi Weekly Conference Call--Marcel Peinado, Bob Wu, Rich Horner, Chris May, Rich Graff, RBF, Jeremy Johnstone.